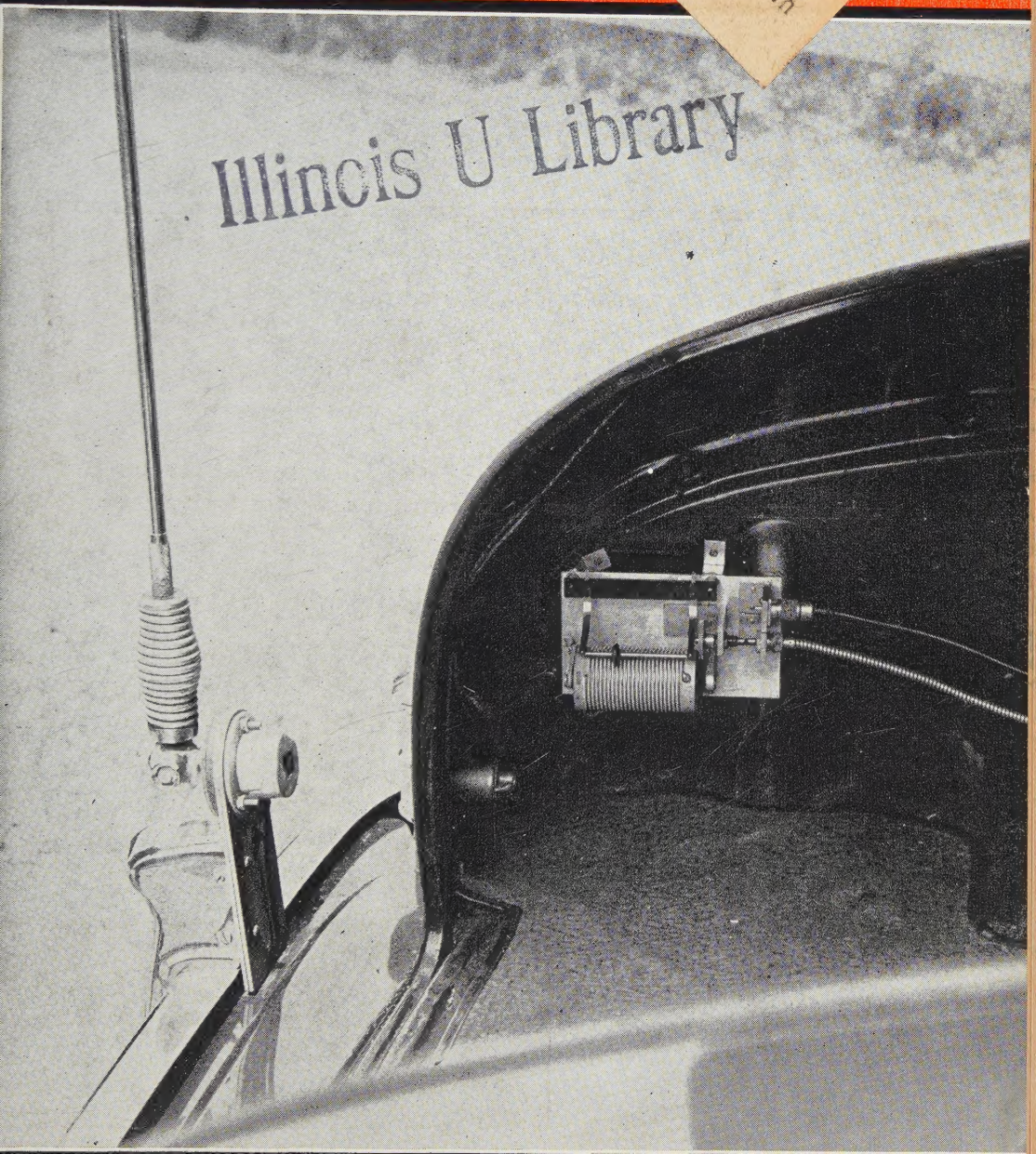
CQ

RADIO AMATEURS' JOURNAL

JULY
1952

UNIV OF ILLINOIS-LIBRARY
CHGO UNDERGRAD DIV
NAVY PIER
CHICAGO 11 ILL
DEC 52
IK--669

Illinois U Library



hallicrafters

Announces

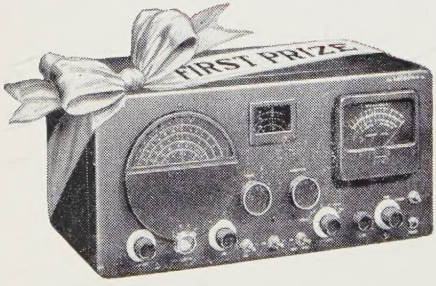
THE WINNERS!

Here are the "FIRST TEN" Novices who have qualified under Hallicrafters 1951-52 Awards . . . and the winners of the famous Hallicrafters S-76 Receivers!



Here they are . . .

W5TPR	Chuck F. Riker Box 1546, Levelland, Texas	**W4TFX**	Philip E. Battey 2008 N. Cleveland, Arlington, Va.
W1UBM	Miss Norma Jean Guile 188 Boswell Ave., Norwich, Conn.	**W6NGZ**	Jack D. Reeder, 1712 Camino Primevera, Bakersfield, Calif.
W6NDP	Ken Lamkin 4717 Huntington St., Fresno, Calif.	**W5TFP**	Ray Thacker, 725 Cherry Ave., N.W., Ardmore, Okla.
W5TFD	James R. Cromwell R.F.D. 63 N, Lacombe, La.	**W8HEV**	Thomas J. Woodward, 3792 Montgomery, Detroit 6, Mich.
W4TED	William A. Brown, Apt. C-14, Felton Homes, Macon, Ga.	**W5TIQ**	Fred G. Apple, Jr. 1615 Gum St., N. Little Rock, Ark.



You Can Still WIN $25.00

Remember, every novice who works all states and obtains his General or Conditional Class Amateur License between Sept. 7, 1951, and Sept. 7, 1952, will win $25.00. For rules governing contacts and verifications, see page 6, "Operating an Amateur Station." Verifications must be postmarked no later than October 7, 1952.

So keep trying . . . and the best of luck!

S-76

WORLD'S LEADING MANUFACTURERS OF *PRECISION* RADIO & TELEVISION • CHICAGO 24, ILLINOIS

hallicrafters

"The Radio Man's Radio"



6BK5

9-Pin Miniature Beam Power Amplifier

Heater voltage, a-c or d-c	6.3 v
Heater current	1.2 amp
Max plate voltage	250 v
Max plate dissipation	9 w



GANGWAY FOR HIGH SENSITIVITY plus real audio wallop! With just a few volts' drive, the new 6BK5 will put out enough power for BIG speaker response!

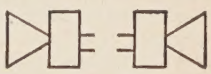
COMPARE the 6BK5's 3.5-w output from 5 v drive, with performance of these well-known audio types:

6AK6	requires 9 v drive to put out 1.1 w
6AS5	requires 8.5 v drive to put out 2.2 w
35L6GT	requires 8 v drive to put out 3 w
6BF5	requires 7.5 v drive to put out 1.9 w
35C5	requires 7.5 v drive to put out 1.5 w

YOU'LL FIND MANY WAYS to apply this new G-E marvel that hears more, and repeats it loudly! A 1-tube phono-amplifier for the junior op.—the power-output stage of your new receiver—an improved circuit for your home-entertainment amplifier—these are among the numerous possibilities.

YOUR G-E TUBE DISTRIBUTOR is ready with price and further facts. See him today! *Tube Department, General Electric Company, Schenectady 5, New York.*

RADIO MILESTONE:



Tubes for Loud-Speaker Reception

● In 1925, General Electric developed the first special radio tubes for loud-speaker reception. This was but one of many pioneering steps by which wireless was freed from earphones, to take its place as today's foremost communications and entertainment medium. The long succession of General Electric radio-tube "firsts" is background for the superior design of advanced types like the 6BK5 which you buy and install in 1952!

ELECTRONIC TUBES OF ALL TYPES FOR THE RADIO AMATEUR

GENERAL ELECTRIC

166-188

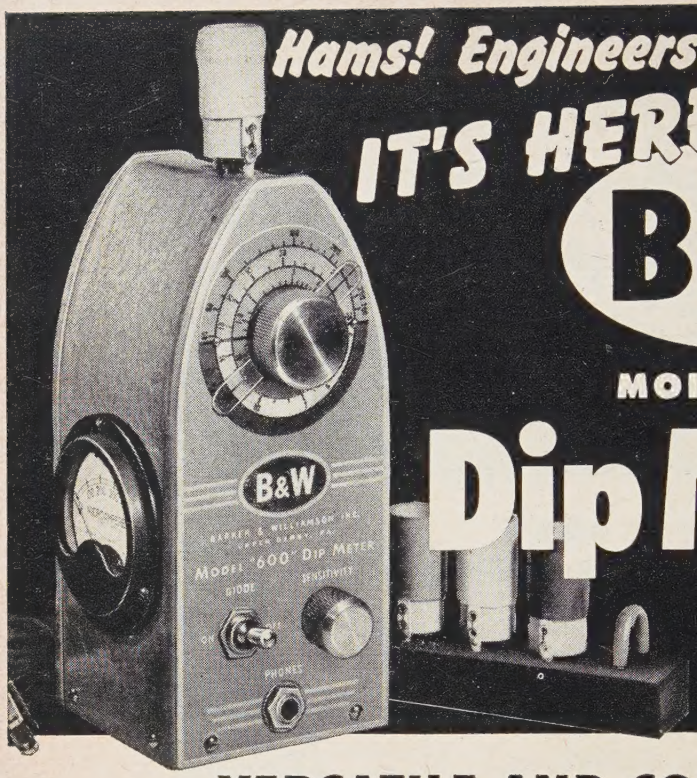
Hams! Engineers! Servicemen!

IT'S HERE!

B&W

MODEL 600

Dip Meter



Supplied complete with 5 color-coded plug-in coils

VERSATILE AND COMPACT

Few instruments will prove so handy in so many ways as this versatile B&W Model 600 Dip Meter. Ideal for lab, production, service, or ham shack use, it provides a quick, accurate means for measuring resonant circuit frequencies, spurious emissions and many other tuned circuit characteristics. Shaped for easy use in today's compact electronic assemblies, highly sensitive and accurately calibrated, it incorporates many features previously found only in higher-priced instruments. You'll find dozens of uses for it as . . .

. . . **A Grid Dip Oscillator** for determining resonant frequencies of tank circuits, antennas, feed line systems, and parasitic circuits; aligning filters and traps; peaking coils, neutralizing and tuning xmitters before power is applied.

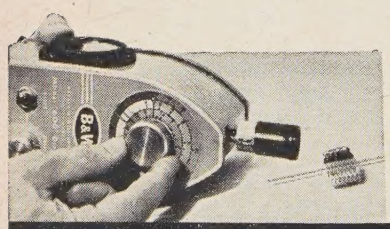
. . . **An Absorption Wave Meter** for accurately identifying the frequency of radiated power from various xmitter stages; locating spurious emissions causing troublesome TVI and BCI, and many similar uses.

. . . **An Auxiliary Signal Generator** providing a signal for tracing purposes and for preliminary alignment of receivers, converters, and I-F stages.

. . . **An R-F Signal Monitor** for audible observation of hum, audio quality, and other audible characteristics of radiated power.

. . . **For Capacity, Inductance, and "Q"** measurements in conjunction with other components of known value.

A Quality Instrument Priced Within Reach of All



- √ Covers 1.75 to 260 mc. in 5 bands
- √ Adjustable sensitivity control
- √ Handy wedge-shape for easy access in hard-to-get-at places
- √ Size 3" x 3" x 7". Weighs only 2 lbs.
- √ Monitoring jack and B+ OFF switch
- √ Rust-proofed chassis, aluminum case
- √ Built-in power supply for 110 volts A.C.

Sold by B & W distributors throughout U.S.A. and Canada. Data bulletin sent on request.

PRICE $48 net

BARKER & WILLIAMSON, Inc. 237 Fairfield Avenue, Upper Darby, Pa.

CQ RADIO AMATEURS' JOURNAL

VOL. 8, NO. 7
JULY, 1952

EDITORIAL STAFF

MANAGING EDITOR
OLIVER P. FERRELL

TECHNICAL EDITOR
E. M. BROWN, W2PAU

•

DEPARTMENT EDITORS

lph Anderson, W3NL	Mobile
erb Brier, W9EGQ	Novice
ayne Green, W2NSD	Teletype
eorge Jacobs, W2PAJ	Propagation
. E. McNatt, W9NFK	VHF-UHF
uisa B. Sando, W5RZJ	YL
C. Spenceley, KV4AA	DX

•

CONTRIBUTING EDITORS

Herb Becker,	W6QD
Frank C. Jones,	W6AJF
G. F. Montgomery,	W3FQB
William I. Orr,	W6SAI
W. M. Scherer,	W2AEF

•

DRAFTSMAN
Thomas Smith, W2MCJ

•

BUSINESS STAFF

R. COWAN,	Publisher
L. CAHN,	Adv. Director
N. REIZES,	Adv. Mgr.
SALTMAN,	Prod. Mgr.
CAMPBELL,	Edit. Prod.
WEISNER,	Circ. Mgr.

nch Offices: Ted E. Schell, 112 West 9th eet, Los Angeles 15, Calif. Vandike 8921.

eign Subscription Representatives: Radio Se- y of Great Britain, New Ruskin House, Little sel St., London, WC 1, England. Technical k & Magazine Co., 297 Swanston St., Mel- rne C1, Victoria, Australia.

- (title Reg. U.S. Pat. Office) - is published thly by Cowan Publishing Corp. Executive Editorial offices, 67 West 44th Street, York 36, N. Y. Phone MUrray Hill 080. Reentered as Second Class Matter ruary 6, 1951 at the Post Office, New k, N. Y. under the Act of March 3, 1879. scription rates in U. S. A. and Possessions, ada & Pan American Union, 1 year $3.00, ears $5.00. Elsewhere, $4.00 per year. gle copies 35 cents. Printed in U. S. A.
re contents copyright 1952 by Cowan Pub- ng Corp.

FEATURE ARTICLES

The "Modern," Heterodyne Exciter
Don M. Wherry, W6EUM 13

A One Element Vacuum Tube Transmitter
Philip S. Rand, W1DBM 20

A Noise Limiter for Everyone
William S. Grenfell, W4GF 24

Men of Radio (part III)
William R. Wellman 33

My Mobile Antenna
A. J. Spatola, W6DAE 37

Ground Plane Matching Network
William I. Orr, W6SAI 39

Maintaining Mobile Antenna Resonance
W. M. Scherer, W2AEF 41

Departments

The YL's Frequency 27

Ionospheric Propagation Conditions 29

Shack and Workshop 38

The Novice Shack 43

DX and Overseas News 47

The VHF News 50

Miscellaneous

Scratchi 4

Broad Band 6

Zero Bias 11

Master's Reports 64

Classified Ads ..... 70 and 71

Advertising Index 72

Designed for

Application



The No. 90651

GRID DIP METER

The No. 90651 MILLEN GRID DIP METER is compact and completely self contained. The AC power supply is of the "transformer" type. The drum dial has seven calibrated uniform length scales from 1.5 MC to 270 MC with generous over laps plus an arbitrary scale for use with special application inductors. Internal terminal strip permits battery operation for antenna measurement.

JAMES MILLEN MFG. CO., INC.

MAIN OFFICE AND FACTORY

MALDEN

MASSACHUSETTS



Feenix, A

Deer Hon. Ed:

This is a mere shadow riting you. I are not e Scratchi—just a number. In fackly, not even kn ing what number I being, as stoopid chiefs of po who running this callaboose are holding me inc munication or some such things. And the food the jale—Oh, my aching Hon. Back, it are piteo Of course, you can telling the soup from the di water. It very easy, on acct. the dishwater is thic and tastes better.

Having you ever been in Feenix in the summe Of natchurally, if you having been, you undoubtl have been residing at some cosy guest ranch, w swimming suit on, keeping cool by sipping la glassfuls of cacktus jooce. No, I meaning have y ever been incarcerated in local jalehouse in the su mer? My advice is . . . don't. It so hot here tha taking daily bread ration and making toast out it just by holding it against the bars of my cell. kidding, Hon. Ed!

Speaking of being hot, that are what starti Scratchi on the road to being in present predic ment. It are cupple days ago. I had been getti hotter and hotter at home one evening, so fina deciding to take ride in my car to cool off a H As I are driving around I coming to drive-in theat so deciding to see the movie. Natchurally I not pa ing to get in, as having discovered some side roa where can sneaking in and still seeing and heeri picture. I've only been caught once or twice, and a still a little sore at owner of drive-in theatre, b deciding to watch picture this night anyway.

I driving up side road, parking car where I c see the movie, then getting extra-long length twisted pair from trunk of car, ducking throu fence, hooking it to spare drive-in speaker, bringi lead back to car, and hooking it to speaker in c Pretty slicky stunt—now I not only seeing mo but heering it too. Ten minutes later are wishi I hadn't bothered at all, although it are nice a cool with breeze coming through car window. Re son I wishing I stayed home is that the picture one of those mushy love story things, which Scratc can't standing.

Are getting so bored that I finally turning filaments of mobile rig, and listening across ba on receiver. Heering a few locals on, so deciding call seek-you. Are no sooner pressing push-to-ta switch than horribul sound coming from speak Feedback! Somehow or other, the mobile rig a causing feedback to drive-in movie sound system. H

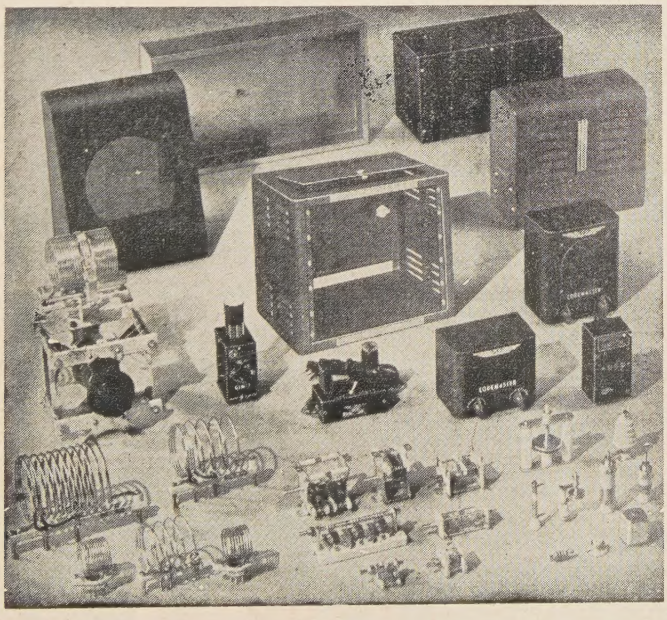
(Continued on page 6

There is ~~no~~ *one* substitute for experience — BUD

You don't have to be an expert to select electronic components or sheet metal products. Buy Bud products and you know that you're getting the best — because they are the result of over 23 years' experience in manufacturing electronic components. For "top-flight" performance buy Bud products for all your needs. Made to the same high standard . . . they work better together.

Almost a year has passed since you Novices have obtained your licenses and many of you are planning to change to General Class. This means the purchase of equipment to change the scope of your operations.

Bud Products are the first choice of both the amateur and the professional. You can assure yourself of more pleasure — safe and efficient operation by selecting Bud Electronic Components and Sheet Metal Products. Consult your Bud Distributor for the widest assortment for your needs or send for copy of Bud Catalog.



BUD

The Mark of Perfection

BUD RADIO, Inc.

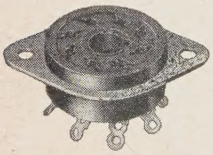
2120 EAST 55th STREET CLEVELAND 3, OHIO



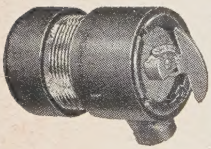
AMPHENOL

for Better Performance–

RF CABLES made by Amphenol are the product of continuous research and development by Amphenol's expert staff of engineers. These low-loss cables are designed to give top performance under all conditions! Rigid production control and inspection assure that they will perform as specified.



"MIP" TUBE SOCKETS are the strongest in the world! The sturdy steel mounting plate is molded directly into the solid bakelite body. This eliminates the possibility of the mounting plate loosening or vibrating.



POWER PLUGS made by Amphenol meet the need for a water-proof connector for use in close quarters where little space is available. These plugs are separated or drawn together by a single screw for quick connect or disconnect.



RF CONNECTORS provide an efficient connecting link between coaxial cables. Amphenol RF Connectors provide never-failing continuity, low RF loss and a long life of sustained performance.



AUDIO CONNECTORS are now standard for audio circuits on Signal Corps communication equipment. Amphenol Audio Connectors are ruggedly built for severe usage and are completely water-proof. Contacts are self-cleaning and have an extremely low voltage drop.

------mail coupon for literature

AMERICAN PHENOLIC CORPORATION
1830 SOUTH 54TH AVE. • CHICAGO 50, ILLINOIS

☐ Send me the 48 page general catalog B-2.
☐ Add my name to your mailing list for monthly information on currently new products and technical data . . . AMPHENOL ENGINEERING NEWS.

NAME_____

FIRM NAME_____

ADDRESS_____

CITY_____ STATE_____

Broad Band . .

"Special Mobile Issue"

Editor, CQ:
The May issue of CQ was a "super-duper." While I not a mobile fan, I did enjoy every article. . .

Ted Dell, KH6N

Makema, Maui. T. H.

Editor, CQ:
Just finished leafing through the May issue of y magazine, and I read where you wanted the readers' op ion of an all-mobile issue. I couldn't resist writing y You sure have done a grand job, and I would like to more of the same.

Richard Finch, W3RK

Pittsburgh, Pa.

Editor, CQ:
Fine business on the mobile issue. I'll cast my v for more of these special issues.

B. H. Sams, W7P

Seattle, Washington

Editor, CQ:
In regard to your editorial in the May 1952 issue, ple record my vote as 100% against further "Special Issue For one, I'd buy only those issues dealing with my o particular specialty.

C. L. Wood, W2VMX

West Hartford, Conn.

Editor, CQ:
My sincere congratulations on your May issue. I the finest yet, and I've taken the magazine from its v first issue.
Since every ham uses and is interested in antenn may I suggest a "bang-up" issue on antennas, feedlin masts, parasitic arrays, etc., etc.

Russell F. Hardy, W8AQ

Dayton, Ohio

Editor, CQ:
You asked for this! Your mobile issue was useless to n When I saw, "Sorry! No prediction tables this mon Had to make room for mobile material," I hit the ceilin they are the only thing I really take your magazine f

Roger D. Mace, W6RI

Los Angeles, California

Editor, CQ:
O. K. on the May issue and it will certainly serve a mobile handbook.
Like the idea suggested about "Special Issues." Perha one could be made on antennas giving the dope a especially how and why of matching in the case of usi two Yagis to be fed with co-ax.

C. A. Haas, W2HI

Perth Amboy, N. J.

Editor, CQ:
Just received the May issue of CQ. Brother, that o issue alone really amounts to a handbook! Congratulatio on the work you are doing. Sure glad my subscription paid up as I would hate to risk loosing any single issu

D. E. Chapman, W9DP

Lombard, Illinois

Thanks for a very compact and comprehensive tre ment of mobile operation as set forth in the May iss of your magazine. . . . as a reader and as a ham would like to see more "Special Issues."

Leslie C. McCall, WØVV

St. Louis, Missouri

✓Check up on PRs



√ STABILITY

Stay put with PRs! They're really LOW DRIFT . . . without sacrificing high output characteristics. X-ray orientation guarantees uniform cut for maximum low-drift performance . . . drift limited to less than 2 cycles per MC per degree.

√ ACCURACY

Guaranteed accurate within .01 per cent of specified frequency or better. When doubling and quadrupling, accuracy is absolutely necessary. You KNOW where you are with PRs.

√ POWER OUTPUT

PRs are designed to give maximum power output from the exciter stage. They will stand up under the high voltages and currents common in amateur operation. PRs can "take it" and like it.

√ ACTIVITY

PRs give you high activity. They "come in" instantly on phone . . . key without chirps, even at high bug speeds, without excessive "backing off."

√ Unconditional GUARANTEE

Every PR Precision CRYSTAL is guaranteed unconditionally by the makers of fine crystals since 1934.

√ EXACT FREQUENCY AT NO EXTRA COST

You pay no premium for exact frequency (integral kilocycle) within Amateur Bands. PR endeavors to keep its jobbers supplied with EVERY FREQUENCY available to amateurs.

20 METERS, Type Z-3, $3.75 • 40, 80 AND 160 METERS, Type Z-2, $2.75

PR Crystals

Since PR 1934

USE PR AND KNOW WHERE YOU ARE

PETERSEN RADIO COMPANY, INC.
2800 W. BROADWAY • COUNCIL BLUFFS, IOWA

ANOTHER

SONAR FIRST

FOR THE AMATEUR!



5 BAND MOBILE

COMPLETE RECEIVER

80, 75, 20, 10 and 11 meters

- Built in B.F.O. to copy S.S.B. and C.W., also helps to locate weak signals! A must for mobile!
- Built in A.N.L. won't reduce or distort audio.
- Full 180° electrical bandspread on all bands.
- Full view sloped three color dial, accurately calibrated.
- Better than 1 micro-volt sensitivity.
- 500 K.C. IF's.
- 8 tubes including V.R.
- Tuned R.F. mixer and oscillator circuits.
- Exceptionally good selectivity.
- 10-slug-tuned-circuits.
- 4 watts of audio output to any PM speaker.
- Physical size: $5\frac{3}{16}$" x $5\frac{11}{16}$" x $4\frac{5}{16}$".
- Will outperform any converter auto set combination. Try one and see for yourself.

Complete with tubes, plugs and mounting brackets.

$89.95 NET

Less Pwr. Supp. and Spkr.

See Them At Your Dealer

SONAR Radio

Write For Literature.

59 MYRTLE AVE,, BROOKLYN, N. Y.

Editor, CQ:

You did a bang-up job on the Special Mobile Issu The best I ever saw. You've started going places (again ? keep it up.

Bryan Lamb, WØDY

Hubbell, Nebraska

Editor, CQ:

I like the idea of special issues. I like a nice fat issu of CQ with everything pertaining to amateur radio.

Agathon Albion, W2UM

Lewiston, New York

Editor, CQ:

Although I am not particularly interested in mobi transmission, I enjoyed the entire May issue. Nothin like being up to date, theoretically.

Lewis J. Friedman, W2IC

New York

Editor, CQ:

The May issue of CQ arrived in the mail yesterda morning, and I thought you might be interested in th one ham's appraisal of this special mobile issue.

Of course, I stayed up half the night reading it fro cover to cover, so I'm a bit sleepy today but I can sti see enough to type a few sentences to let you know tha I consider this issue a "classic."

Earl M. Perry, W9BV

Chicago, Illinois

Editor, CQ:

I have just gone through this month's CQ from cov to cover and believe me, it was well worth the money paid for it. Although I have not gone mobile as ye expect to do so, and will find this month's CQ invaluab to me.

Robert W. Flynn, WN6GP

Los Angeles, California

Editor, CQ:

. . . I would have been equally disgusted to find devoted to RTTY, AM, FM, PM, TV, CW, FSK, net ope tion, shop practice, operating procedure, vacuum t keyers, or the sex life of the brontosaurus. . . it's sort like shooting a June-bug with a 10-gauge shotgun at 3 paces. You can't see the bug, but there's a chance you' hit it.

George Thurston, W4ML

Harrisonburg, Va.

Don't Forget Your Address

The average day brings at least a dozen piece of mail that must be answered and handled personall by the Managing Editor. Many of these letters dea with amateur radio both in the past and in the future Of particular importance are the manuscripts whic are received from amateurs in the field. It is thes unsolicited manuscripts which form the backbone o the exceptional material that can be presented in CQ

It is very disturbing to find that a number o manuscripts, etc. are received from authors who d not supply their correct or latest mailing address At the present time there are several manuscript at hand which have been returned by the post offic department as being "undeliverable." In particula we would like to note the one received last Novembe from W7GWA entitled, "News From Slippery Creek." The post office claims that W7GWA "moved and lef no forwarding address."

Don't forget—if writing the CQ staff, for eithe editorial reasons or for problems relating to you subscription—always include your latest and correc mailing address.

A ONCE-IN-A-LIFETIME OPPORTUNITY TO



make your hobby your job

Although you are probably employed as an engineer in the electronics industry right now, how often have you said, when dreaming up a hot new circuit for your rig, "Boy, I wish I could make ham radio my job!"

Well, now you have a once-in-a-lifetime chance to do just that — if you've got the stuff we need! The type of man we're looking for is not just another engineer. He must be a top-flight man with an electrical engineering degree from an accredited college. He should have a good communication background, but more than that he should have a passion for true *creative* electronic engineering. He should be a man who loves to think up new ideas and work 'em out.

Are *you* that man? If you are, National offers you an exceptionally good salary, generous social benefits and a pretty swell bunch of people to work *with*. Most of all, you'll be working for *the* outstanding maker of ham equipment — you *can* make your hobby your job!

Write and tell us about yourself — where you went to school, what you've been doing, what you'd like to do — and, of course, include the usual details of age, marital status, present salary, etc. We'll give you a definite decision just as soon as possible.

President, National Company, Inc.

Write to
Personnel Department

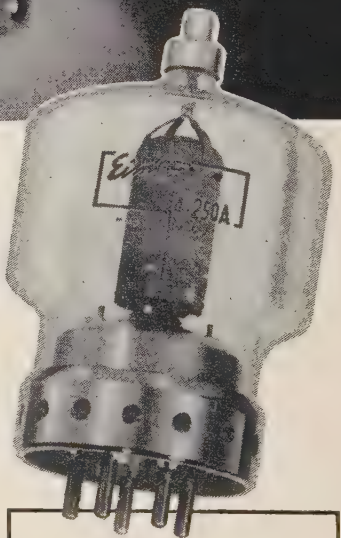
NATIONAL COMPANY, INC.
61 Sherman St.
Malden, Mass.

WORK YOUR FAVORITE BANDS with the EIMAC 4-250A



Low driving power with high output plus compactness, neat design and durability make Eimac's 4-250A the amateur radio operators best buy for operation through 54 mc. Only two to three watts are needed to drive this power tetrode to a kilowatt when used as an amplifier in the new 21 mc. band and other regions including the 54 mc. band. A pair of 4-250A's will loaf along at a thousand watts in Class-C fone service. Rated at a maximum plate dissipation of 250 watts this tube requires only simple circuits to give top performance and less TVI. As a modulator two 4-250A's will deliver as much as 750 watts audio with resistance coupled 6SJ7's as drivers. A proven performer, the 4-250A gives dependable operation as an amplifier, oscillator or modulator.

Information about the 4-250A can be obtained from your Eimac dealer.



Typical Operation
(frequencies below 75 mc.)
Radio Frequency Power Amplifier and Oscillator Class-C FM or Telegraphy (key down conditions one tube).

D-C Plate Voltage	3000 volts
D-C Screen Voltage	500 volts
D-C Grid Voltage	—180 volts
D-C Plate Current	345 ma.
Plate Power Input	1035 watts
Plate Dissipation	235 watts
Plate Power Output	800 watts

Eimac TUBES

EITEL-McCULLOUGH, INC.
San Bruno, California
Export Agents: Frazar & Hansen, 301 Clay St., San Francisco, California



Eternal darkness

will not halt the progress of our brother hams who are sightless. The Braille Technical Press, available to all blind hams and radio technicians, needs your financial support. Can you spare a dollar to help a friend?

Send contributions to:

Bob Gunderson, W2JIO, Editor,
The Braille Technical Press, Inc.,
980 Waring Ave., New York 67, N. Y.
[Contributions are deductible for tax purposes.]

DIRECTORS

Lawrence L. LeKashman, W9IOP
W. Stanley Wartenberg, W2ET
James M. Pickett
George W. Bailey, W2KH
C. M. Chorpenning, W8MJM
Merritt M. Clark, W2MWS
Everett A. Erickson, W1NLM
Robert W. Gunderson, W2JIO
Merle E. Frampton
David A. Heavner, W2USQ
Morton B. Kahn, W2KR
Clifford P. Miller
Harry T. Miller, W3KBS
David Ormont
Philip S. Rand, W1DBM
Harry J. Sutcliffe, W2MIO
Paul Von Kunits
Mrs. Robert Gunderson

(Printed in place of "Zero Bias," July, 1952.)

AUTHORIZED COLLINS DISTRIBUTORS

Aberdeen, South Dakota
- Burghardt Radio Supply P.O. Box 342

Albany, New York
- Ft. Orange Radio Distributing Co., Inc., 642-644 Broadway

Albuquerque, New Mexico
- Radio Equipment Co. 523 E. Central Ave.

Allentown, Pennsylvania
- Radio Electric Service Co. of Pa., Inc., 1042 Hamilton St.

Amsterdam, New York
- Adirondack Radio Supply P.O. Box 88, 32 Guy Park Ave.

Atlanta, Georgia
- Specialty Distributing Co. 425 Peachtree St., N.E.

Atlantic, New Jersey
- Radio Electric Service Co. of Pa., Inc., 452 N. Albany Ave.

Augusta, Georgia
- Specialty Distributing Co. 644 Reynolds St.

Baltimore, Maryland
- Kann-Ellert Electronics, Inc., 9 South Howard St.

Birmingham, Alabama
- Ack Radio Supply Co. 2205 Third Ave., N.

Boston, Massachusetts
- DeMambro Radio Supply, Inc., 1111 Commonwealth Ave.
- Radio Shack Corp. 167 Washington St.

Butler, Missouri
- Henry Radio Co. 211 North Main

Camden, New Jersey
- Radio Electric Service Co. of Pa., Inc., 513-15 Cooper St.

Chattanooga, Tennessee
- Specialty Distributing Co. 709 Chestnut St.

Chicago, Illinois
- Allied Radio Corp. 833 W. Jackson Blvd.
- Newark Electric Co. 323 W. Madison St.

Cincinnati, Ohio
- Steinberg's Inc. 633 Walnut St.

Cleveland, Ohio
- The Progress Radio Supply Co., 413-15 Huron Road
- Radio & Electronic Parts Co. 3235 Prospect Ave.

Columbus, Ohio
- Thompson Radio Supplies 182 E. Long St.

Concord, New Hampshire
- Evans Radio 10 Hills Ave.

Corpus Christi, Texas
- Electronic Equipment & Engineering Co. 805 S. Staples St.

Council Bluffs, Iowa
- World Radio Laboratories, Inc., 744 West Broadway

Dallas, Texas
- Crabtree's Wholesale Radio 2608 Ross Ave.

Dayton, Ohio
- SREPCO, Inc. 135 E. Second St.

Denver, Colorado
- Radio Products Sales Co. 1237 Sixteenth St.

Des Moines, Iowa
- Radio Trade Supply Co. 1224 Grand Ave.

Detroit, Michigan
- M. N. Duffy & Co. 2040 Grand River Ave., W.

Duluth, Minnesota
- Lew Bonn Co. 228 E. Superior St.
- Northwest Radio 123 E. First St.

Easton, Pennsylvania
- Radio Electric Service Co. of Pa., Inc. 916 Northampton St.

El Paso, Texas
- C. C. McNicols 811 Estrella

Eugene, Oregon
- United Radio Supply Co. 179 W. Eighth St.

Everett, Washington
- Pringle Radio Wholesale Co. 2514 Colby Ave.

Ft. Wayne, Indiana
- Ft. Wayne Electronics Supply, Inc. 223 E. Main St.

Greensboro, North Carolina
- Johannesen Electric Co., Inc., 312-14 N. Eugene St.

Hollywood, Florida
- Carl's Radio Shop 2323 Hollywood Blvd.

Indianapolis, Indiana
- Graham Electronic Supply, Inc., 102 S. Pennsylvania St.

Jackson, Tennessee
- L. K. Rush Co. P.O. Box 1418

Jacksonville, Florida
- Kinkade Radio Supply 1402 Laura St.

Jamaica, New York
- Harrison Radio Corp. 172-31 Hillside Ave.

Johnstown, Pennsylvania
- Cambria Equipment Co. 17 Johns St.

Kansas City, Missouri
- Radiolab 1612 Grand Ave.

Lafayette, Indiana
- Lafayette Radio Supply, Inc., 627 Main St.

Lexington, Kentucky
- Radio Equipment Co. 480 Skain Ave.

Little Rock, Arkansas
- Carlton Wholesale Radio

Long Beach, California
- Scott Radio Supply 266 Alamitos Ave.

Los Angeles, California
- Henry Radio 11240 W. Olympic Blvd.
- Kierulff & Co. 820-830 W. Olympic Blvd.
- Radio Products Sales, Inc. 1501 S. Hill St.

Louisville, Kentucky
- Universal Radio Supply Co., Inc., 533 S. Seventh St.

Madison, Wisconsin
- Satterfield Radio Supply, Inc., 326 W. Gorham St.

Memphis, Tennessee
- Lavender Radio Supply Co., Inc., 1014-16 Union Ave.
- W & W Distributing Co. 639 Madison Ave.

Milwaukee, Wisconsin
- Central Radio Parts Co. 1723 W. Fond du Lac Ave.

Minneapolis, Minnesota
- Lew Bonn Co. 1211 La Salle Ave.

Muncie, Indiana
- Radio Supply of Muncie, Inc., 305 N. Madison

New Haven, Connecticut
- Dale-Connecticut, Inc. 140 Ferry St.

New Orleans, Louisiana
- Radio Parts, Inc. 807 Howard Ave.

New York, New York
- Harrison Radio Corp. 10 West Broadway
- Harvey Radio Co., Inc. 103 W. 43rd St.

Norfolk, Virginia
- Radio Equipment Co. 821 W. 21st St.

Oakland, California
- W. D. Brill Co. 10th & Jackson Sts.
- Electric Supply Co. 140 - 11th St. at Madison

Peoria, Illinois
- Klaus Radio & Electric Co. 707 Main St.

Philadelphia, Pennsylvania
- Radio Electric Service Co. of Pa., Inc. 3412 Germantown Ave.
- Radio Electric Service Co. of Pa., Inc., 5930 Market St.
- Radio Electric Service Co. of Pa., Inc., N.W. Corner 7th & Arch Sts.

Phoenix, Arizona
- Radio Parts of Arizona 214 S. 11th St.

Pittsburgh, Pennsylvania
- Cameradio Co. 963 Liberty Ave.
- The Tydings Co. 5800 Baum Blvd.

Portland, Oregon
- Pacific Stationery Wholesale Radio Dept. 414 S.W. Second Ave.
- United Radio Supply Co. 22 N.W. Ninth Ave.

Providence, Rhode Island
- W. H. Edwards Co. 94 Broadway

Rock Island, Illinois
- Tri-City Radio Supply Co. 1919 Fourth Ave.

St. Louis, Missouri
- Walter Ashe Radio Co. 1125 Pine St.

St. Paul, Minnesota
- Lew Bonn Co. 141-147 W. Seventh St.
- Hall Electric Co. 386 Minnesota St.

San Antonio, Texas
- Amateur Headquarters & Supply, P.O. Box 5086, Beacon Hill Station

San Diego, California
- Western Radio & TV Supply Co., 1415 India St.

San Francisco, California
- San Francisco Radio & Supply Co. 1282-1284 Market St.

Seattle, Washington
- Western Electronic Supply Co., 717 Dexter

South Bend, Indiana
- Radio Distributing Co. 432 Carroll St.

Spokane, Washington
- Northwest Electronic Co. N. 102 Monroe St.

Springfield, Ohio
- SREPCO, Inc. 119 W. Main St.

Tacoma, Washington
- C & G Radio Supply Co. 2502-6 Jefferson Ave.

Tampa, Florida
- Kinkade Radio Supply 402-04 W. Fortune St.

Texarkana, Arkansas-Texas
- Lavender Radio Supply Co., Inc., 520 E. Fourth St., P.O. Box 596

Toledo, Ohio
- Selectronic Supplies, Inc. 1013 Jefferson Ave.

Topeka, Kansas
- The Overton Electric Co., Inc., 522 Jackson St.

Tucson, Arizona
- Elliott Electronics, Inc. Box 5081 418 N. Fourth Ave.

Tulsa, Oklahoma
- Radio, Inc. 1000 S. Main St.

Tyler, Texas
- Lavender Radio Supply Co., Inc., 503 E. Oakwood

Washington, D. C.
- Electronic Wholesalers, Inc. 2345 Sherman Ave., N.W.

Watertown, South Dakota
- Burghardt Radio Supply P.O. Box 41

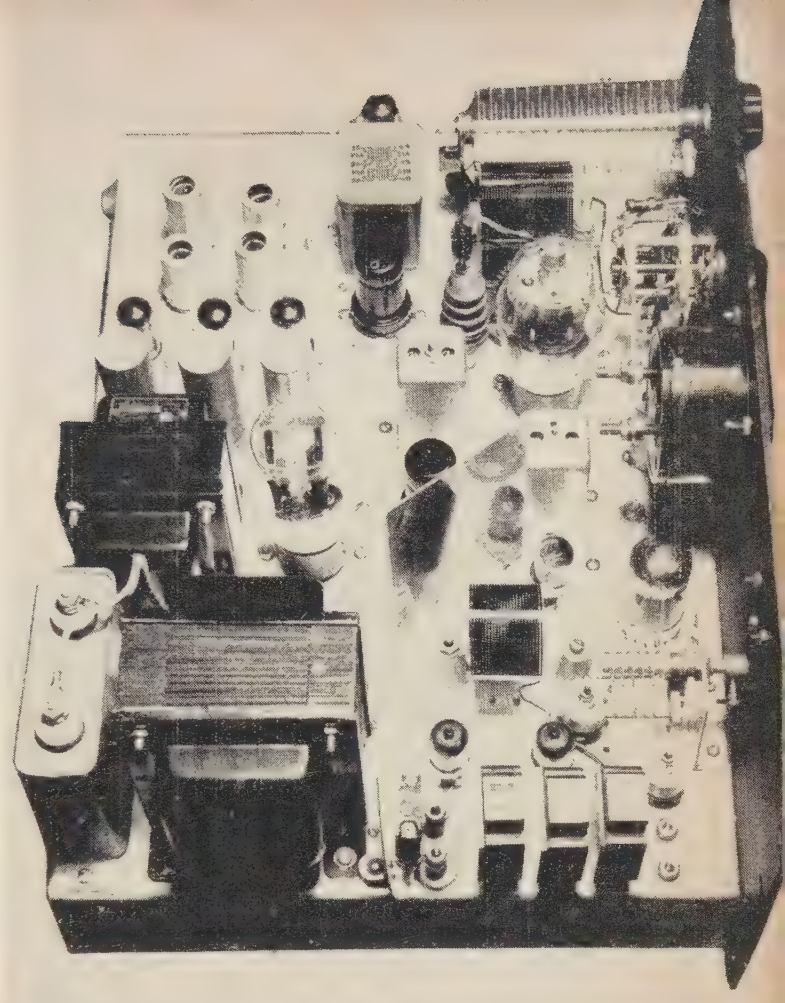
Wilmington, Delaware
- Radio Electric Service Co. of Pa., Inc., S.E. Corner Third & Tatnall Sts.

FOR THE BEST IN AMATEUR RADIO, IT'S . . .



COLLINS RADIO COMPANY, Cedar Rapids, Iowa

11 W. 42nd St., NEW YORK 18 **1930 Carpenter Blvd., DALLAS 2** **2700 W. Olive Ave., BURBANK**



At the lower right can be seen the oscillators with the 6C4 tubes just above the crystals. Directly above the VFO coil is the 6BE6 mixer with the keyer tube towards the front panel. The 807 final amplifier is plainly visible. Audio, power supply and VR tubes to the rear of the chassis.

The "MODERN"– A Heterodyne Exciter

DON M. WHERRY, W6EUM*

The author doesn't claim that this exciter will do everything in the shack but sweep the floor. Naturally, no one would want anything like that. On the other hand, the author has reduced his various circuit ideas to bare essentials as viewed by present-day operating standards and requirements. See if you don't find something of use in this exciter. —Editor

Here is an exciter or low power transmitter that has almost everything you can possibly use, all in one compact unit. You may not want to duplicate the complete exciter, but you may wish to incorporate some of the rather novel features in your next rig. For CW men there is break-in operation and soft, chirpless keying. Phone men have voice operated break-in, filtered audio for more punch, and a choice of either AM or FM. Both groups will like the frequency stability, the ease of direct calibration with almost any desired bandspread, the Pi network output tuner which will load almost anything, and the healthy power output which will easily drive a half kilowatt triode or a kilowatt pentode.

Oscillators

The principle objection to the use of break-in with CW is that an oscillator cannot be readily

*Box 306 Camarillo, Calif.

keyed and still produce soft, chirpless signals. In order to meet this problem, as well as some others, the circuit in *Figure 1* was developed. You will notice that there are actually two oscillators, one crystal controlled, and the other variable. When these two are mixed in the following stage the resultant is the actual output of the VFO.

The crystal oscillator uses the standard Pierce circuit with a 9 mc crystal. This crystal is used when the exciter is to be VFO controlled. A five position switch (*S1*) also allows the selection of any of four other crystals in the 3.5-4 mc range for fixed frequency operation. The Pierce circuit was selected because it requires a minimum of parts, provides stable operation, and will work with almost any crystal.

The variable oscillator uses the remarkably stable Clapp circuit and covers the 5 to 5.5 mc range.

A combination of series and parallel trimmers are used in the variable oscillator for band setting, allowing both the high and the low end of the band to be set exactly or, of even more importance to the CW man, any portion of the band to be expanded to give full dial coverage.

The exciter output frequency is the difference between the 9 mc crystal oscillator and the 5 to 5.5 mc variable oscillator: 3.5 to 4 mc. These two oscillator frequencies were chosen primarily because of the availability of 9 mc crystals. Considerable latitude is permissible in the choice of these frequencies if two important considerations are taken into account: 1) They should be of such a value as to have no harmonics in the lower frequency amateur bands. 2) They should be higher than the mixed frequency in order to avoid direct harmonics riding through the mixer. If your receiver has poor image rejection you should also consider the possibility that the oscillators might interfere on image frequencies. Little trouble should be encountered since the oscillators are run at very low power and the unit is well shielded in a metal cabinet.

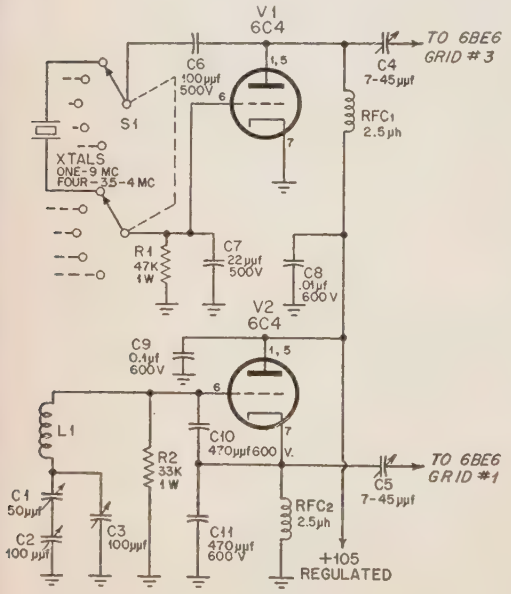


Figure 1

R1—47,000 ohm, 1 W
R2—33,000 ohm, 1W
C1—50 μμf variable (Bud type MC)
C2, C3—100 μμf variable (Hammarlund APC)
C4, C5—7 to 45 μμf ceramic trimmers
C6—100 μμf 500V mica
C8—.01 μf 600V paper
C10, C11—470 μμf 600 V mica
RFC1, RFC2—2.5 mh chokes (receiving type)
S1—Crystal switch, two wafer, 6 position

This approach to VFO design has several special advantages. Since neither of the oscillators are on the operating frequency it is quite feasible to let them run continuously. This greatly improves the frequency stability of the VFO and eliminates the possibility of any chirp in the signal. Only when the mixer stage is keyed will there be any output on the operating frequency. Thus you have break-in operation on your own frequency without elaborate shielding of the oscillator. If only the lower hundred kilocycles of the 7 mc band are of interest, for instance, it is simple to adjust the trimmers so that the VFO dial will just cover that range with full dial movement. Obviously, the one difficulty with this system is that the dial calibration is not linear.

The main tuning condenser is *C1* while *C2* and *C3* are air trimmers. To set the calibration set *C1* to maximum and adjust *C3* for 5 mc output of the variable oscillator or for 4 mc output at the mixed frequency. Next set *C1* to minimum and adjust *C2* for 5.5 mc output of the variable oscillator or 3.5 mc output at the mixed frequency. It will be necessary to juggle back and forth a few times since the two adjustments interlock.

The shielding of the two oscillators is up to you. It is not of great importance under normal conditions. In this exciter they are shielded from the magnetic field of the power transformer by a baffle.

Condensers *C4* and *C5* are small ceramic trimmers which are used to provide the minimum injection voltage to the mixer necessary for adequate output from the stage. They may, if trimmers are in short supply, be substituted by a fixed capacity of 30 μμf (approximately). The trimmers are preferred because too heavy coupling will not only overload the mixer, but will "pull" the Clapp oscillator when the mixer is keyed, destroying one of the prime advantages of non-oscillator keying.

Mixer

The mixer and associated circuits are shown in *Fig. 2*. In wiring the 6BE6 mixer be sure to connect the grid leaks from grid #1 (VFO injection) and grid #3 (crystal injection) to the cathode and not to ground as the keyer tube will put a large bias on the mixer grid otherwise.

The switch *S2* is used for spotting the frequency in the receiver. Choose a value for *R6* that will give a weak signal on the highest frequency band to be used.

Break-In Circuits

Any convenient tube having a low plate resistance may be substituted for the 7C5 keyer tube. The

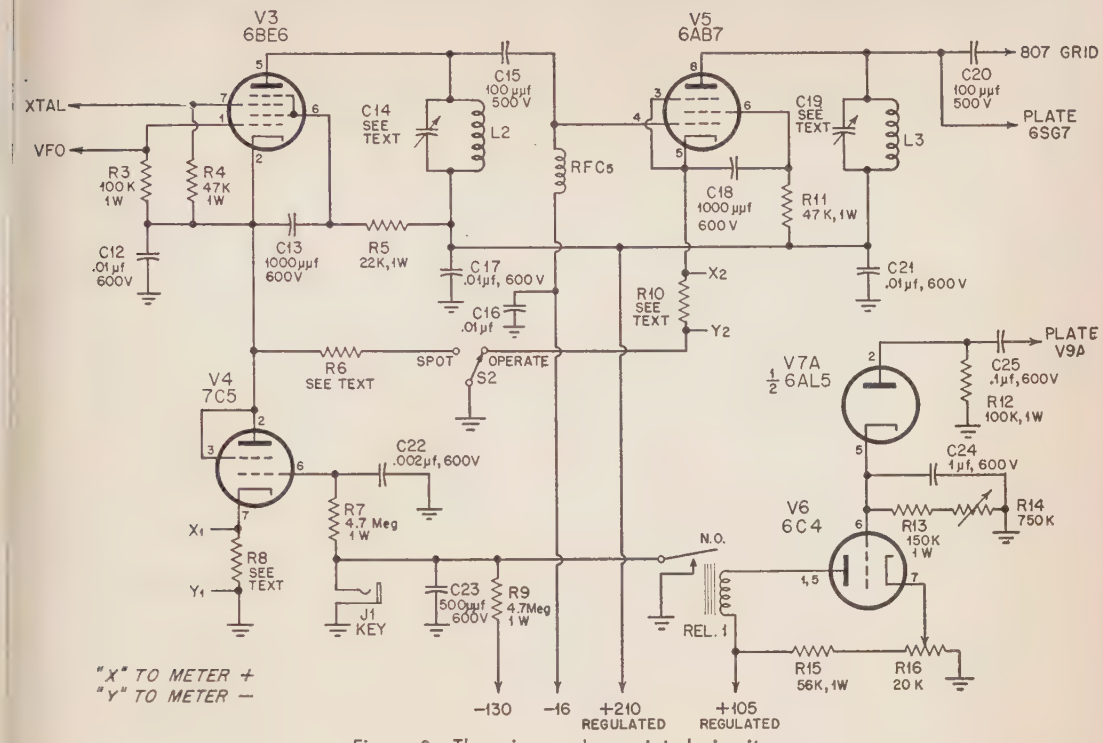


Figure 2. The mixer and associated circuits.

6AS7 is fine electrically, but it is high priced, has an over size envelope, and terrific filament demands.

The phone break-in circuit utilizes a 6C4 with a 10,000 ohm relay as its plate load. The normally open contacts are wired in parallel with the keying jack. At *rest* (no modulation) the plate current is cut off due to the positive bias applied to the cathode by the setting of *R16;* this allows the relay to open. As speech starts, the grid is driven positive, causing the plate relay to close, thereby turning on the transmitter. The upper limit of the grid voltage (rectified a.f. from the audio system) is held to a nearly constant value regardless of the speech amplitude by the limiting action of the grid which, when swung positive by the rectified a.f. draws current and levels off the positive peaks. This is easy to understand when it is considered that the grid-cathode impedance of the tube drops to approximately 1000 ohms with positive bias. This limiting action means that the time delay between the end of the speech signal and the opening of the relay is independent of the loudness of the last spoken word or sound. The delay is just as long for a shout as for a slight sigh.

There are several ways to connect the a.f. rectifier tube (6AL5), however, this particular circuit was chosen because it presents a lighter load to the audio tube (½-6J6, *V9A*).

The initial adjustment of the break-in circuit is simple and should seldom need attention. With everything turned on and no speech input, set *R16* at the point where the plate relay just drops out. Next adjust the delay potentiometer (*R14*) for the desired time delay. That's all.

R3, R12—100000 ohm, 1W
R4, R11—47000 ohm, 1W
R5—22000 ohm, 1W
R6—Adjust for VFO set (see text)
R7, R9—4.7 megohm, 1W
R8, R10—Meter shunt (see text)
R13—150000 ohm, 1W
R14—750000 ohm potentiometer (Centralab)
R15—56000 ohm, 1W
R16—20000 ohm potentiometer (Mallory 4 watt, type A20MP)
C12, C16, C17, C21—0.01 μf, 600V paper
C13, C18—1000 μμf, 600V mica
C14—Trimmer in i.f. can (see text)
C15, C20—100 μμf, 500 V mica
C19—Trimmer in i.f. can (see text)
C22—2000 μμf, 600V mica
C23—500 μμf, 600V mica
C24—1 μf, 600V paper
RFC5—2.5 mh (Rec. type)
S2—Toggle S.P.D.T.
J1—Key jack (Phone jack)
Rel 1—10000 ohm relay (RBM 71-5131P2)
L2, L3—See coil table

Audio

The cathode current of the 6AK5 audio tube (see *Fig. 3*) is used to provide mike voltage for a carbon mike input. The audio is filtered from the cathode circuit by the 40 μf condenser. If you do not wish to use a carbon mike the usual crystal mike input can be utilized and the transformer omitted. The output of the 6AK5 drives both sections of the 6J6, one section (*V9A*) furnishing power for the phone break-in tube, and the other feeding the AM and FM modulators. Since the

grid of the break-in section is driven positive during modulation a 56,000 ohm resistor *(R30)* is placed in series to prevent the tube from unduly loading the 6AK5. The output of this stage is rectified by one-half of the 6AL5 *(V7A)* and applied to the grid of the 6C4 break-in tube already described. The audio from the second half of the 6J6 *(V9B)* passes through a low pass filter, narrowing the width of the speech channel, and driving the 6SG7 FM modulator and the 6AQ5 AM modulator.

Phase Modulator

The 6AB7 *(V5)* needs little comment as it is a standard phase modulated stage. Fixed bias is applied to the grid allowing the cathode to be grounded (through the meter shunt resistor). Both the buffer and the mixer plate coils (*L2* and *L3*) are wound on i.f. transformer forms (old winding removed) using one trimmer for the tank condenser. They are wound to resonate in the 3.5 mc band. This method is simple and provides adequate shielding for a low level stage.

The 6SG7 *(V10)* is a reactance tube modulator operating across the plate tank of the 6AB7 *(V5)* buffer tube. Care should be used in advancing the gain control for there is enough audio to allow a very large deviation. One undesirable feature of this type of modulator is that the buffer tank, and all following stages, must be tuned to the operating frequency. If this is not done there will be quite a large component of AM present. This "defect" is common to all FM systems and should cause little concern. If the modulated, or de-tuned stage, is

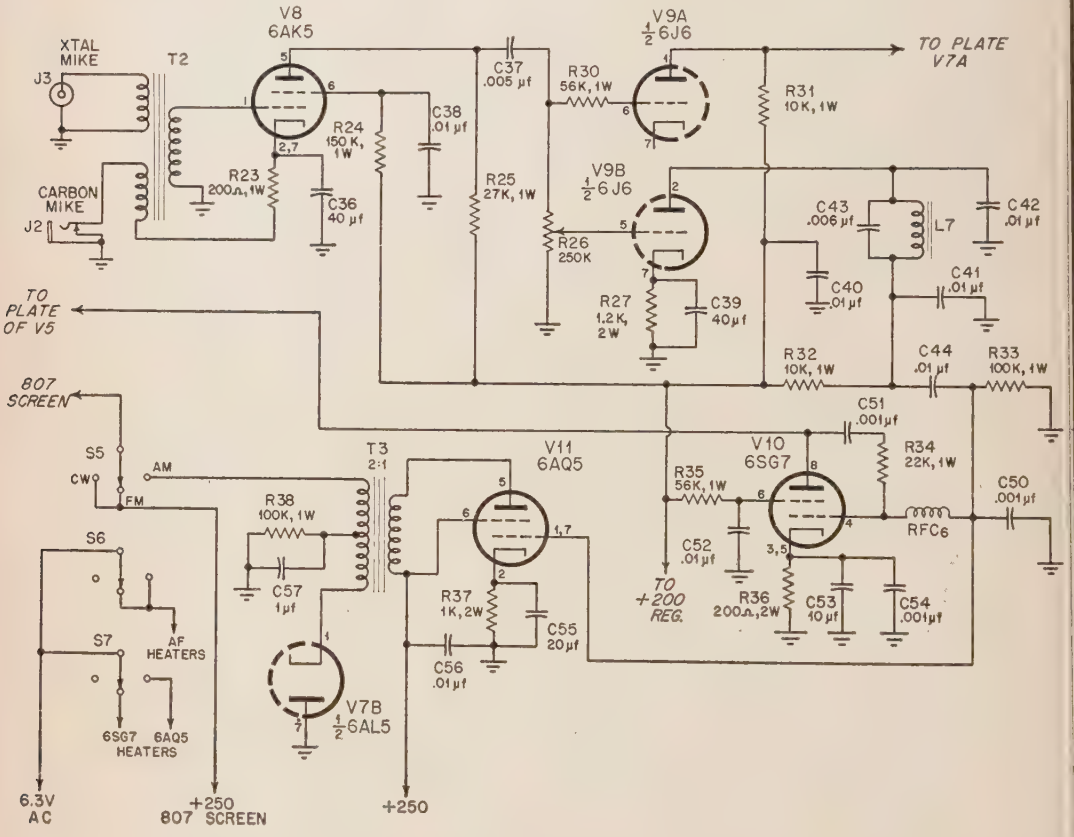


Figure 3. The audio and associated stages.

R23—200 ohm, 1W
R24—150,000 ohm, 1W
R25—27,000 ohm, 1W
R26—250,000 ohm potentiometer (centralab)
R27—1200 ohm, 2W
R30, R35—56000 ohm, 1W
R31, R32—10000 ohm, 1W
R33, R38—100000 ohm, 1W
R36—200 ohm, 2W
R37—1000 ohm, 2W
C36, C39—40 μf, 25V electrolytic
C37—5000 μμf, 600V mica
C38, C40, C44, C52, C56—0.01 μf, 600V paper
C41, C42—10000 μμf, 600V mica
C43—6000 μμf, 600V mica
C50, C51, C54—1000 μμf, 600V mica
C53—10 μf, 50V electrolytic
C55—20 μf, 50V electrolytic
C57—1 μf, 600V paper
RFC6—2.5 mh, (Rec. type)
L7—Choke, 0.25 henry (Millen 34400-250)
S5, S6, S7—Function Sw., 3 pole, 3 position
J2—Carbon mike jack (Mallory 702) shorting type
J3—Crystal mike jack (Amphenol)
T2—Mike transformer (Peerless A4282)
T3—Driver transformer (Stancor A4405)

followed by one or two more stages of class "C" amplification which are correctly tuned, the AM will be quite effectively ironed out.

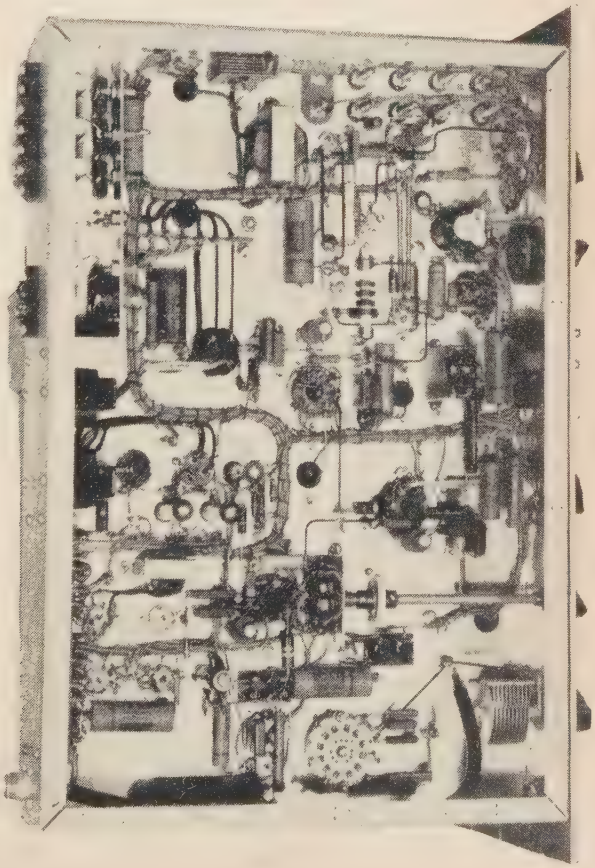
RF Output Stage and Amplitude Modulator

The output stage uses a 807 *(V16)* with capacity coupling from the buffer with fixed bias. Since self-oscillation is frequently a problem with 807's several precautions were taken to eliminate such tendencies. The screen 50 ohm resistor *R20*, is connected directly to the screen socket terminal, the other end being bypassed to the cathode. A small choke (*L4*) of five to seven turns is wound around a two watt 100-ohm resistor and connected directly to the plate cap. If this doesn't do the job completely a shield can be added to the 807. (See *Fig. 4.*)

The tank circuit is the familiar Pi network of which too much cannot be said. It will match a wide range of impedances and literally load into the XYL's clothesline. When a low impedance line such as RG8/U is used the harmonic suppression is very good. For forty meter output there is a tap on the tank coil (*L5*), thus *S5* causes the 807 to act as a doubler for this band. Shunt feeding is used so that there will be no d.c. voltage on the tuning condensers and tank coil. The meter can measure the grid current, screen current, or the total tube current.

The AM modulator is an application of the constant percentage modulation system and as such is well adapted to driving a high power class "B" linear amplifier. The 6AQ5 has as its plate load a coupling transformer with a turns ratio of two to one. Half of the secondary voltage is rectified by one section of the 6AL5 (*V7B*), the voltage showing up across *R38* and the filtering condenser *C57*. This voltage raises the center tap of the secondary above ground an amount proportional to, and following, the speech level. Superimposed on this d.c. voltage is the audio component from the remaining half of the transformer secondary, the resultant voltage varying from about zero to twice the d.c. value. The peak d.c. voltage at the center tap should be adjusted to about 100 volts maximum with "loud" speech. Under test, with the gain control *fully* advanced, there was 175 volts, this caused distortion since the 807 is not even close to linear through such a wide range of screen voltage.

This system of AM deserves much greater popularity than it now enjoys for it has several characteristics that are quite advantageous. For example there is high percentage of modulation at any audio level, that is, the r.f. energy radiated is just sufficient to accommodate any given level of audio. This results in greater intelligibility at low signal levels and a decrease in interference from heterodynes. It also, as mentioned, makes the use of class B linear



The entire exciter is built on a standard Bud 13x17x13 inch aluminum chassis. The TVI filters are in the upper left-hand corner. The wiring has all been carefully cabled. All r.f. wiring is made of #12 solid enameled.

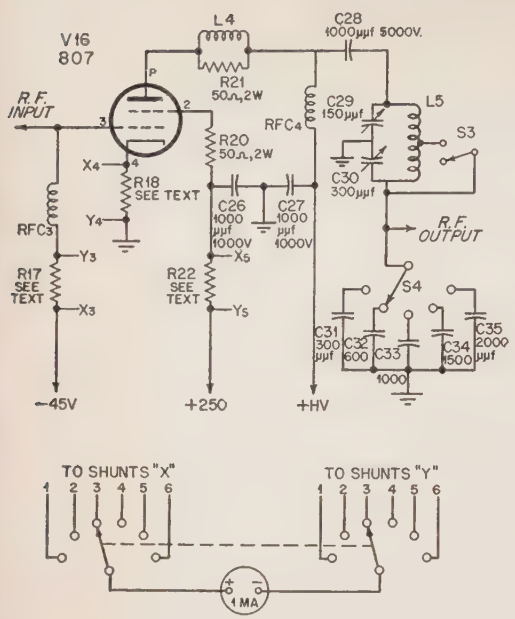


Figure 4. The output stage.

R17, R18, R22—Meter shunt (see text)
R20, R21—50 ohm, 2W
C26, C27, C33—1000 μμf, 1000V mica
C28—1000 μμf, 5000V mica
C29—150 μμf, variable (Bud #1535)
C30—300 μμf, variable (Bud #910)
C31—300 μμf, 1000V mica
C32—600 μμf, 1000V mica
C34—1500 μμf, 1000V mica
C35—2000 μμf, 600V mica
RFC3—2.5 mh choke (Receiving type)
RFC4—Transmitting type (5 pin surplus)
S3—Band Sw., single gang, two position (Mallory 172C) Ceramic
S4—Antenna loading Sw., (Mallory 172C) Ceramic
S8—Meter Sw., two pole, six position
L4, L5— See coil table

amplifiers more practicable. This system is preferable to the clamp tube modulation system which does not have the "constant percentage" feature. Admittedly, many operators have achieved this feature with the clamp tube system, but only by misadjusting the clamper bias and thereby cutting the negative peaks of the speech envelope badly, a procedure that has little to recommend it.

Power Supply

The a.c. power lines are filtered for TVI suppression with *L8, L9,* and the associated condensers. Contracts *A* & *B* on the terminal strip are the main a.c. line connections. Terminal *C* furnishes a.c. to any other equipment that you want to turn on and off with the main power switch, *S9,* or makes it possible to turn on the exciter with an external switch connected across terminals *B* & *C*. *S10,* the "Standby" switch, is brought out to terminal *D* for remote control. The high voltage for the 807 goes through the jumper on the terminal strip from *F* to *G*. In this way it is simple to use an external power supply for the 807 plate should higher power be desired from the output stage.

A small filament transformer (*T4*) is used to provide 110 volts to the selenium bias supply. Resistor *R50* (33 ohms) acts both as a fuse in case of a short in the bias supply and as a peak current limiting resistor for the rectifier, preventing it from being damaged. The final adjustments of the 807 bias voltage (-45V) may be made either by varying the *R39-40-41* network, or by changing the capacity of *C62* (more capacity to increase the bias, less to decrease bias).

Voltage regulation is used for the oscillators, phone break-in, audio, mixer, and buffer stages. Variables *R47* and *R49* should be adjusted for 3/4 volt drop across the resistors.

Meter Multipliers

No values are given for the meter shunts *(R8-10-17-18-22)* or the series resistors *(R42+43)*. These values will depend upon the meter you use and may be found with the following formulas:

$$\text{SHUNT} \quad R_s = \frac{R_m}{(n-1)}$$

R_s—Shunt or Series Resistor Required
R_m—Meter Resistance
n—Scale Multiplication Factor

$$\text{SERIES} \quad R_s = R_m\ (n-1)$$

In case the meter resistance is not known it can be computed by connecting a small battery, the meter, and a potentiometer in series and adjusting the potentiometer for full scale deflection of the meter. Then, without touching anything, connect another potentiometer in parallel with the meter and adjust it for one-half scale deflection of the meter. The resistance of this potentiometer is equal to the resistance of the meter and may be read with an ohmmeter. Putting an ohmmeter across the

COIL DATA

L1—Bud 80 meter 75 watt plug in with link and 7 turns removed. Base removed and mounted on standoffs.
L2, L3—Mixer and buffer plate coils made from i.f. transformer forms. Remove the i.f. windings and wind with 75 turns of no. 28 enameled. (see text)
L4—UHF choke, 6 turns no. 20 enameled around R21.
L5—Bud 80 meter 75 watt plug in with link and base removed and mounted on standoff insulators. Tap 14 turns from plate end for 40 meter tap.
L8, L9, L10, L11, L12—UHF choke, 37 turns no. 20 enameled on 3/8" form, winding 1.5" long.
Note—Due to the small diameter of the coil the turns will vary widely with the parts and wiring placement. Some "cut and try" will probably be necessary.

meter does not give the actual meter resistance since there is usually a built-in shunt resistor in the meter.

The scale multiplication factor (n) can best be explained by using an example. If you have a 0-10 ma. meter and want it to read 0-20 ma. The value of "n" would be $\frac{20}{10}$, or 2. You are multiplying the scale by 2.

In this exciter a 0-1 ma meter was used shunted to read 50 ma on the mixer and buffer plates, 5 ma on the final grid, 250 ma on the final plate, 50 ma on the final screen, and 1000 volts on the high voltage.

Other Notes

Care should be taken not to overdrive the mixer stage for a very small input from the two oscillators is sufficient for good mixing. The resultant output of the mixer is small and will be hard to detect with anything but a very sensitive r.f. indicating device. The 807 grid current may be used for peaking both the mixer and buffer stages. When using FM be careful not to turn up the gain control very high for extreme deviation is possible. When calibrating the VFO it is well to remember that as the tuning condenser closes the output of the mixer increases in frequency. This reversal of normal VFO operation results from the using of the difference between the two oscillators.

For good appearance of the finished equipment it is well to put all wiring, resistors, and condensers in only one of the three directions; up and down, right and left, and fore and aft. The extra time spent in doing this will be well rewarded by the enhanced finished product. The d.c. wiring should be grouped and cabled. The r.f. wiring should be in the clear as much as possible, but try to keep it in one of the

(Continued on page 63)

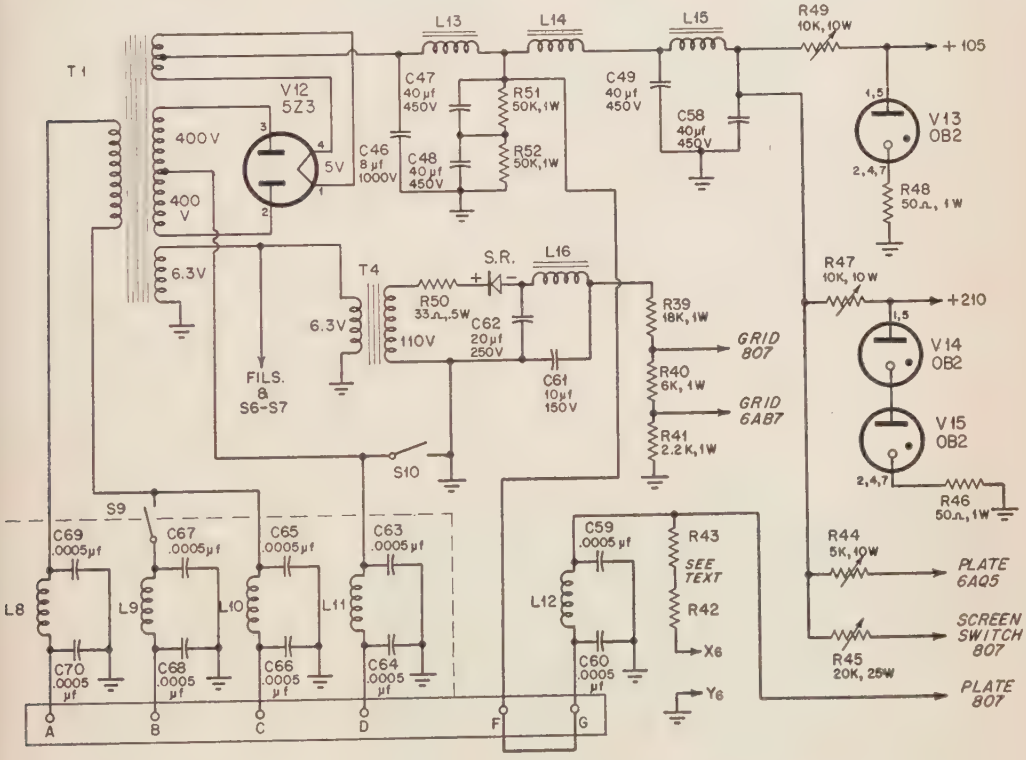


Figure 5. The power supply.

R39—18000 ohm, 1W
R40—6000 ohm, 1W
R41—2200 ohm, 1W
R42, R43—Meter series resistor (see text)
R44—5000 ohm, 10W adjustable (Ohmite Dividohm)
R45—20000 ohm, 25W adjustable (Ohmite Dividohm)
R46, R48—50 ohm, 1W
R47, R49—10000 ohm, 10W adjustable (Ohmite Dividohm)
R50—33 ohm, ½W
R51, R52—50000 ohm, 1W
C46—8 µf, 1000V paper (CD Dykanol)
C47, C48, C49, C58—40 µf, 450V electrolytics (Dual 40—CD's)
C59, C60, C63, C64, C65, C66, C67, C68, C69, C70—500 µµf, 600 V mica
C61—10 µf, 150V electrolytic
C62—20 µf, 250V electrolytic
S9, S10—S.P.S.T. toggle
L13—Choke (Stancor C1412)
L14, L15—Choke (Stancor C1710)
L16—Choke (Stancor C1707)
T1—Power transformer, 400-0-400 at 200 ma; 5V at 4A; 6.3V at 5.5A (Stancor P6165)
T4—Filament transformer, 6.3V at 1.2A, (Stancor P6134)
Selenium rectifier—Grid bias, 65 ma (Federal 1002)

A One-Element Vacuum Tube Transmitter

PHILIP S. RAND, W1DBM*

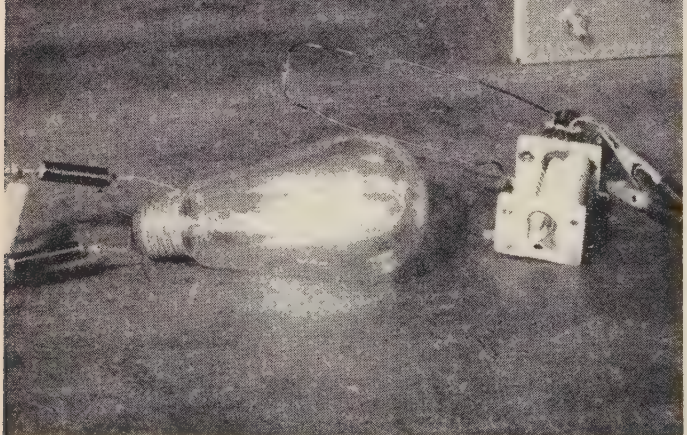
Maybe you are one of those honest and hard working hams that believes TVI is due to our advanced knowledge of circuitry and design. If you are, then read this carefully, because the situation is not that way at all. As a matter of fact the author goes on to show that we have cause to sit back and wonder about many things.—Editor.

This Spring I had the pleasure of attending the Dayton Ham-Vention and heard Al Gunston, W8GQ, discuss his experiments with a "vacuumless" vacuum tube. It seems, according to Al, that the tube manufacturers have been pulling the wool over our eyes for years by putting a vacuum in vacuum tubes solely to prevent us from making them ourselves out of a few odds and ends in the junk box. Al demonstrated this fact conclusively with a one vacuumless tube crystal controlled transmitter. The vacuumless tube used a 110 volt heating element for the filament, a cake grid for the grid, and an aluminum pie plate for the plate. These three elements were supported in their proper relationship right out in the atmosphere and when the tank circuit was tuned to resonance a neon bulb would light on the pie plate and a strong signal was received on a receiver about 5 feet away. The oscillation stopped when the crysta was removed.

This amazing demonstration started me think ing. Upon my return to Redding Ridge, Connecti cut, I busied myself in my home laboratory con ducting some basic research into the generation c radio frequencies. It gives me great pleasure t announce at this time that although radio amateur may have been played for suckers by the tub manufacturers, the tube manufacturers themselve had the greatest hoax of all time pulled on them by the so called inventors of the radio tube. My research reveals that these inventors used mor than one element simply so that they could get a new patent for each element and thereby increas their personal wealth at the expense of the genera public.

In those early days of radio there were no radi engineering handbooks to refer to, and genera knowledge on the subject was lacking so it is eas to see how this hoax could be put over. It was th case of the blind leading the blind. Hitler an Uncle Joe undoubtedly learned from them that i you tell a lie often enough and long enough it wil eventually be considered a truth. Remember that

*c/o Laboratory of Advanced Research, Remington Rand, Inc., South Norwalk, Conn.



The one element vacuum tube undergoes extensive tests in the laboratory directed by W1DBM.

for thousands of years everybody thought the world was flat, while today the world knows it is round, or is it???

During my study of the literature on the subject, I came across a paper written by Drs. Barkhansen and Kurz in 1920 and published in *Phys. Zeits.*, Vol. 21 (describing a short wave oscillator). In 1922, Gill and Morell published a paper in the famous *Philosophical Magazine*, Vol. 44 showing a similar but improved version of this oscillator. This oscillator was known as an "Electron Oscillator" and utilized a triode vacuum tube. (These four learned gentlemen were also victims of the hoax.) *Fig. 1* shows the basic circuit for an "Electron Oscillator." Note that when a triode is used the grid is positive and the plate is slightly negative with respect to the cathode. Speaking of cathodes—they were invented to further the multi-element tube hoax by a lazy inventor who wanted time to smoke a cigarette after he turned his radio on and before he had to reach over and tune in the station. To get back to *Fig. 1*—the mechanism of operation is as follows:[1]

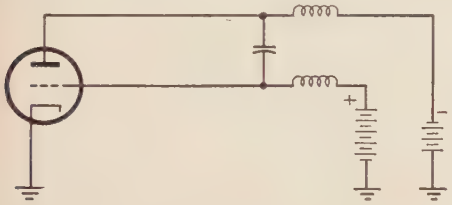


Fig. 1. The basic "electron oscillator" circuit.

The cathode being hot gives off electrons which are attracted to the positive grid.[2] The plate being negative does nothing and might as well be left out. Now the grid, being made of fine wires, is missed by most of the first electrons on the first trip so they circle around and make another pass at it, finally being collected. All these electrons gradually fall into a uniform pattern as they travel from the cathode to the grid and produce the electron oscillation. The frequency of this oscillation depends upon the geometry of the tube elements, the grid voltage, and the attached tuned circuit (to a small extent).[3]

Figure 2 shows how the circuit would look if we used a tube with only a filament and a grid with 120 volts on them, The idea of using 120 volts is that if you are going to make these tubes yourself it is much easier to obtain 120 volt tungsten filaments than any other kind. Furthermore it eliminates the need of a power transformer and a filament transformer. The actual mode of oscillation remains unchanged.

At this point the idea came to us that if we were going to do away with the tube manufacturer and the transformer manufacturer why not also get rid of the parts manufacturer? Why should we spend our hard earned cash on chokes, condensers and tuned circuits? Furthermore we still had to get rid of the grid in the tube. We decided to try to combine the filament grid and tuned circuit. *Fig. 3* shows our first attempt.

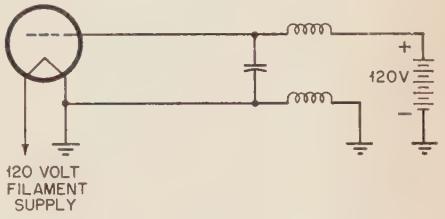


Fig. 2. Surprisingly enough you can get the same results from your "electron oscillator" by removing the plate of the tube and connecting up to the filament and the grid.

A little thought showed that we could use the same tungsten wire for both the grid and the filament because the only part that would emit electrons would be the negative end. This would act as the cathode while the positive end would not only keep its own electrons but would act as the grid and eventually collect those given off by the other end. In this way we would have maintained all the necessary conditions for our "electron oscillations." The long loop in the filament serves as the tuned circuit.

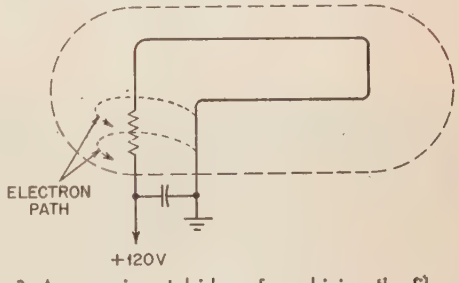


Fig. 3. An experimental idea of combining the filament and grid functions in one element.

In order to mount this long tungsten filament ruggedly and also to arrange it so that it would have the proper inductance, it was wound in a series of hairpins, 2 inches to a leg from a piece of fine tungsten wire salvaged from an old style electric light bulb. *Figure 4* shows this filament before being bent into a circle to fit into the glass envelope. Also shown in *Fig. 4* is the coaxial condenser used to tune the "filament" tank circuit to resonance. The calculated inductance of the special shaped "filament" coil being 0.3 μh, it was necessary to have about 35 $\mu\mu$f of capacity in this condenser in order to hit the 50 mc amateur band where we had decided to conduct our experiments.

1. For a more detailed explanation see Page 521, First Edition of **Radio Engineers Handbook**, by Frederick Emmons Terman.
2. EDISON EFFECT—See Page 5, Second Edition of **Fundamentals of Vacuum Tubes**, by Austin V. Eastman.
3. The frequency is given approximately by:

$$\frac{E_g}{f^2} = \text{CONSTANT}$$

Where E_g is the grid potential, f—the frequency, and constant is a function of the tube geometry.
See Page 282 in the Second Edition of the **Radio Engineering Handbook**, by Keith Henney.

There is nothing critical about either the coil or condenser as the main thing controlling the frequency is the transit time of the electrons[3] in passing from the grounded end of the filament to the plus 120 volt end of the filament. In other words all you need to have to QSY is a heavy-duty potentiometer to vary the combined filament-grid voltage. Raise the voltage to raise the frequency and lower the voltage to lower the frequency.

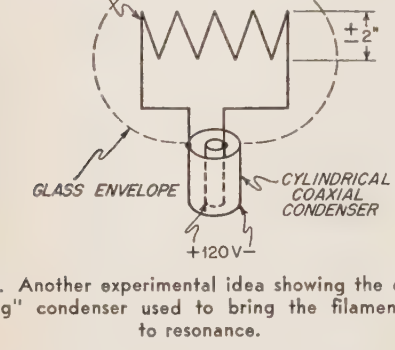


Fig. 4. Another experimental idea showing the coaxial "tuning" condenser used to bring the filament tank to resonance.

An experimental tube of the type shown in *Fig. 5* was tried very successfully. The grounded outside of the coaxial condenser was then threaded for convenience in mounting the tubes in standard light bulb sockets which are readily available in nickle and dime stores. In order to prove once and for all whether or not a vacuum is needed in a vacuum tube, this tube was first filled with ordinary air; next, with a pure inert gas and finally with nothing (an extremely good vacuum). With both the air and gas filled tubes strong oscillations were present as proved by instruments capable of measuring the radiated signal. This turned out to be a wavelength of from 4000 Angstroms to well over 7000 Angstroms. Measurements were made with bo a thermometer and a photographic exposure mete The trained research man will immediately s several applications for such a tube such as dryi paint, use as a reading light, or even the infra-re cooking of hot dogs (one use demonstrated by A Gunstron at Dayton). When the one element tu was tried with a vacuum the story was differen Strong oscillations were present near the 6-mete band. The frequency could be changed at will fro about 56 mc to almost 90 mc simply by varyi the voltage from 70 volts to 160 volts. Experimenta data proves these to be the practical limits. Belo 70 volts the filament gets too cold to give off enoug electrons and over 160 volts the tungsten melts To lower the frequency to 50 mc it is necessary t design a new filament structure so that the voltag electron transit time, and physical geometry a combine to produce oscillations at that frequency

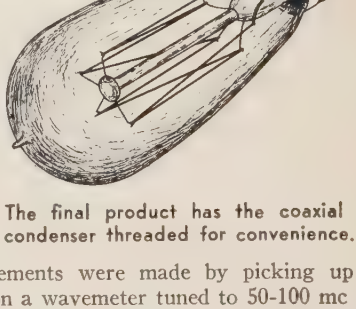
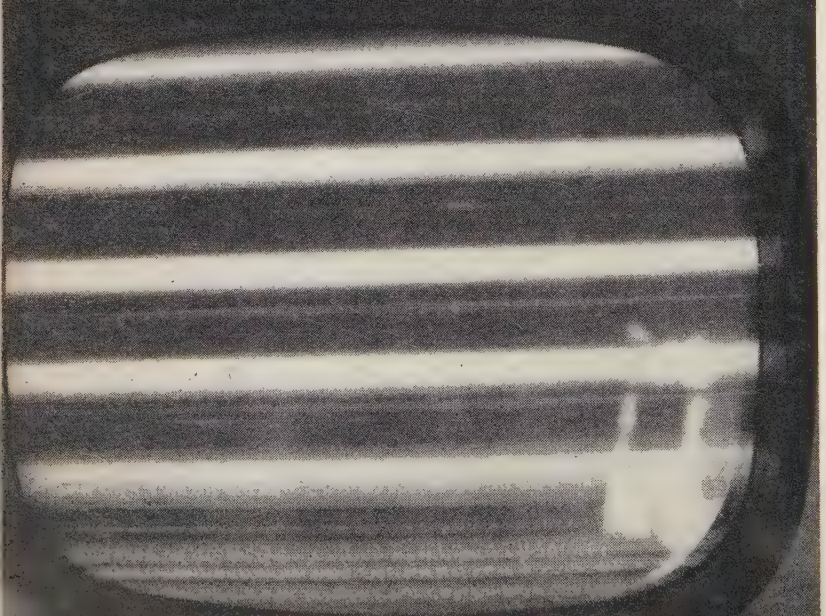


Fig. 5. The final product has the coaxial "tuning" condenser threaded for convenience.

Measurements were made by picking up the r.f signal on a wavemeter tuned to 50-100 mc equipped with a 1N34 crystal diode and looking at the de-modulated signal with an oscilloscope as shown in the photographs. See *Fig. 6.*

To prove that this was an electron type of os-



TVI caused by the one element wonder when operated on straight 120 volts D.C.

cillation, a small permanent magnet was held close to the filament. By rotating the magnet the intensity of the oscillation could be increased or decreased, in fact could be stopped completely, as the magnetic field upset the path of the electrons flowing from the cold end of the filament to the hot end across the vacuum. This phenomenon immediately suggested a simple cheap tubeless modulator, namely, a magnetic ear-phone driven by a carbon mike. In practice the ear-phone is merely placed near the one element vacuum tube transmitter so that electron stream is subjected to a magnetic field that is varying at audio frequencies. I have named this the "Rand System of Modulation."

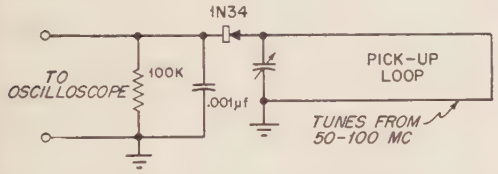
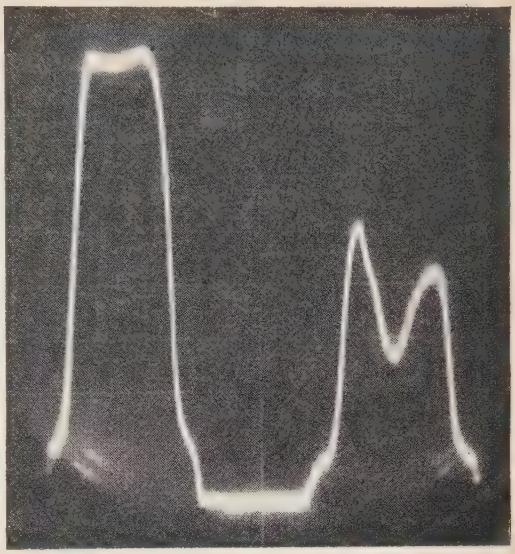


Fig. 6. A wavemeter circuit for detection of oscillations from the one element vacuum tube. This permits the demodulated wave to viewed directly on an oscilloscope.

NBFM is equally easy to apply simply by putting a microphone transformer in series with the 120 volts to the tube. As the mike varies the 120V at audio frequencies the r.f. output varies accordingly.

You have probably all guessed by now another use for this transmitter. By applying 120 volts a.c. at 60 cycles the rig becomes a cheap wide-band FM signal generator sweeping all the low TV channels.

When the FCC opens up the amateur bands for carrier shift keying this is just the rig to use. Connect the key across a small resistor in series

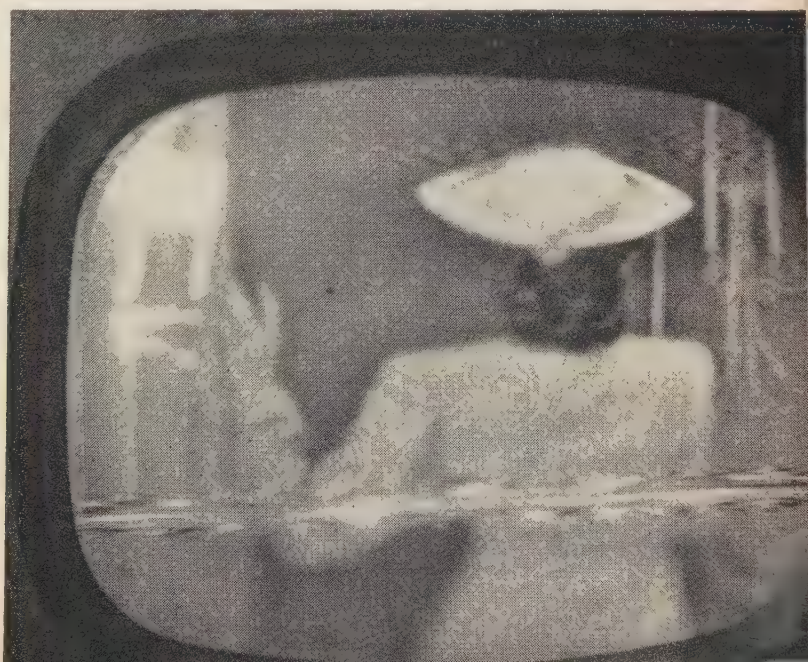


This is the oscilloscope pattern of the audio detected by the crystal circuit in Fig. 6. The transmitter was being operated with 120 volts at 60 cycles and was sweeping from 60 to 80 mc with an FM signal generator.

with the 120 volt input and when the key is closed the frequency will shift by the amount of the voltage change.

There are several more important uses for this new invention, but my straight jacket is too tight to write more at this time and furthermore it is rumored that tubes of this type are in wide use for lighting purposes and cause very bad TVI.[4] (Should think they would) ! ! !

4. See Pages 82, 86, and 87 in the Second Edition of Television Interference, by P. S. Rand.



TVI caused by the one element vacuum tube when operated on regular house voltage at 60 cycles.

A Noise Limiter for Everyone

WILLIAM S. GRENFELL, W4GF*

Part one of two parts

If this were the Proceedings of the I.R.E. instead of CQ we would open our remarks by stating, "This is a tutorial paper." Actually this is another of our mild doses of all-important theory. The author does a remarkable job in his treatment of one of our most essential circuits.—Editor.

In general, noise limiters were not incorporated in standard communications receivers until after World War II. As a result, many pre-war and most war surplus communications receivers lack this very useful circuit. Even the limiters in some of the post-war receivers are not all they could be and may be improved to a considerable extent by minor modifications. Last but not least, a noise limiter must invariably be added to the BC automobile receiver if it is used in mobile operation.

Articles describing the addition of noise limiters have appeared in various radio magazines in the past few years. Most of these articles were limited

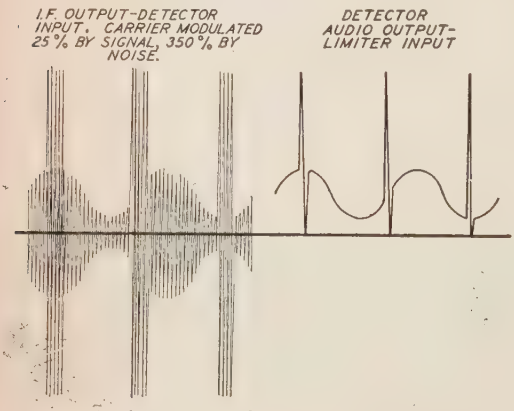


Fig. 1. A duration/amplitude comparison of noise pulse vs. desired signal modulation.

to instructions for adding a limiter to a particular make and model receiver.[1] Because the article was usually concerned with only one make of receiver, and in most cases omitted any discussion as to the actual electrical operation of the limiter circuit, many readers not familiar with the theory of limiter circuits were probably unable to adapt the circuit to general use.

Noise reduction circuits have been developed for application at any of several places in a receiver. Of all these circuits, one of the most effective and simple is the type employing one or two diodes (half or full wave) in series or shunt with the audio connection between the second detector and the first audio stage of the receiver.

The cost of adding a half-wave limiter circuit to a receiver amounts to the price of four resistors, a condenser, a diode, a socket and the on-off switch. The author strongly recommends the full-wave series circuit as the best choice of a limiter circuit. It is superior to a half-wave circuit and only requires a dual diode with two more resistors and one more condenser than a half-wave circuit. Physical lack of socket space for a dual diode should be the only reason for accepting the less effective half-wave circuits.

The Nature of Noise Interference

Understanding the way a simple diode limiter works requires a knowledge of the characteristics of the noise and its relation to the incoming signal. The most common types of noise plaguing the listener are the pulse types such as car ignition, atmospheric noises due to lightning and similar sources causing spark discharges. Compared to the length of a cycle at usual speech frequencies, the pulses of noise are usually of short duration and spaced widely apart (*see Fig.* 1). The reason that these pulses blank out so much of the signal, in spite of the fact that sometimes several cycles of the wanted signal may appear between pulses, is because the pulse amplitude is usually so much greater than the desired signal that when the pulse hits the receiver, the speaker or earphones vibrate much longer than the noise pulse duration. While the human ear is a wonderful device for separating a coherent signal from noise, it seems to have a built-in AVC system which automatically desensitizes itself from the noise. This action of the ear and the presentday electronical/acoustical reproducing devices fills in the gaps between pulses to such a degree that most, if not all, of the desired intelligence is lost.

The receiver i.f. amplifier will also lengthen the noise pulse duration[2]—the amount of "lengthening" being dependent on the bandwidth. High "Q" tuned circuits will "ring" or continue to oscillate beyond the actual duration of the pulse, a narrow band-

*3713 Kemper Rd., Arlington 6, Va.

1. An exception: "A Simple Noise Limiter," R. P. Haviland, Radio and Television News, Aug., 1950, p. 46.
2. "Comparison of Amplitude and Frequency Modulation," M. G. Nicholson, Wireless Engineer, July 1947, p. 197.

width causing greater "stretching" than a broad bandwidth. This action of the i.f. amplifier would indicate the desirability of applying noise limiting to the i.f. section of the receiver before the pulses can become "stretched." Some circuits have been devised for this very purpose. Fortunately most noise pulses still have sufficient space between individual pulses by the time they reach the second detector output to enable the more simple limiter circuits to do a good job. All that needs to be done to effectively limit the noise is to restrict the pulse amplitude to a level near that of the desired signal so that most of the intelligence between pulses can be recovered. While many methods of limiting

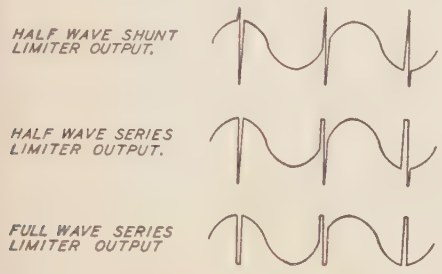


Fig. 2. The relative efficiency of the three basic noise limiter circuits.

noise have been devised[3,4] the three types of circuits discussed herein offer the most effective action for the least complicated circuitry. (See *Fig. 2*)

Simple Shunt Limiter

The way the simple diode limiter works on the noise is to act as a short circuit or an open circuit to the noise pulses without materially affecting the desired signal. Actually the short circuit type, usually known as a "shunt" limiter, is a diode in series with a d.c. bias connected in shunt across the audio output of the second detector of the receiver *(Fig. 3)*. The polarity of the diode and the bias is arranged so that the diode will not conduct until signal or noise voltages exceed the bias value. When the bias value is exceeded, the diode conducts and acts as a low resistance path or by-pass to ground for the excessive voltages. Thus, assuming a "perfect" diode, the amplitudes of all voltages passed on to the audio stage will be limited to a value no greater than the bias voltage. The usual diode is, however, not a perfect short circuit but does have an appreciable internal resistance. The value of this resistance depends partly on the voltage applied to it and partly upon the resistance of the circuit to which it is connected. This characteristic is such that the diode has a lower internal resistance to large voltages than to small voltages[3]. Therefore, some of the voltage in excess of the bias will appear across the internal resistance of the diode and will be passed on to the following audio circuits. In order to reduce the effect of this internal resistance, a logical step is to connect a resistor in series between the detector output and the limiter so that the combination of the two resistances will act as a voltage divider which steps down the amount of voltage passed on to the audio circuit when the diode conducts *(see Fig. 4)*. This is a common practice in the more effective type of shunt limiter and while it also reduces the audio voltage even when the diode is not conducting, its effect on reducing the noise pulses exceeding the bias is proportionately much greater.

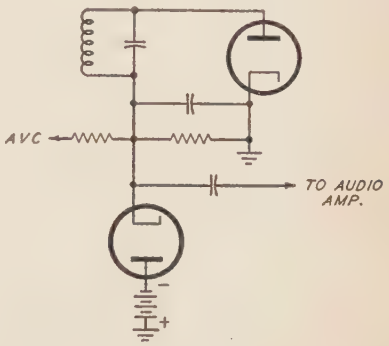


Fig. 3. The short circuit noise limiter is popularly referred to as a "shunt type."

This circuit looks capable of doing the job on a good steady signal where the bias can be set to barely let the audio peaks go by untouched but clip all the noise pulses down to about the same peak value. However, one of the sad facts about radio reception is that most signals fade so rapidly that it would be impossible to follow the signal level with a manual bias control. Thus, a setting proper for a weak signal would severely clip strong signals. Some early noise limiter circuits with manual threshold controls were almost totally useless on fading signals. Fortunately, the bias

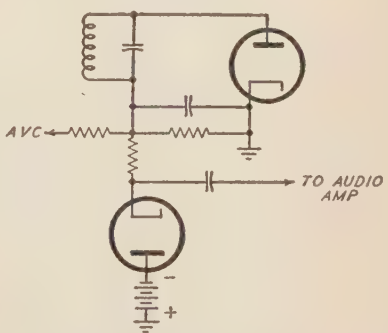


Fig. 4. Inserting a resistance between the detector output and the limiter reduces the effect of internal resistance of the diode.

setting can be taken care of automatically by the same source from which the receiver automatic volume control bias is obtained. This provides a d.c. bias which is proportional to the carrier level and by adjusting the proportion of audio voltage and automatic bias applied to the limiter from the second detector, the limiter can be designed to clip all voltages above a predetermined percentage

3. "Noise and Output Limiters," Emerick Toth, Electronics, p. 114, (Part I), Nov., 1946; p. 120 (Part II), Dec. 1946.

4. "Suppressing Impulse Noises," D. C. Rogers, Wireless World, Dec. 1949, p. 489

of modulation. By making one of the resistors of the circuit a potentiometer instead of a fixed resistor, a percentage of modulation at which limiting begins can be selected and the limiter will automatically clip at the selected level no matter how much the signal is fading.

Clipping Percentage

For those who prefer extreme simplicity, a fixed

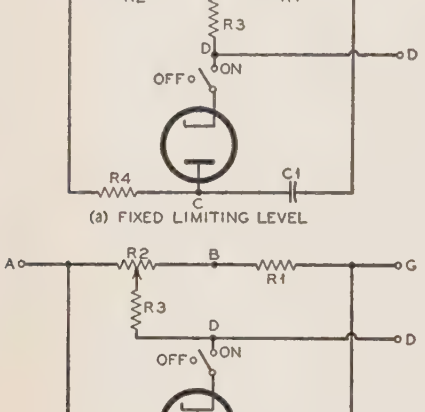


Fig. 5. Two of the most commonly employed shunt type noise limiters. The top circuit (A) uses a fixed ratio of R2 to R1 to determine the clipping level. The bottom circuit (B) features a variable element to determine this level.

percentage of clipping can be quite satisfactory, the amount depending on the listener's taste and the amount of noise to be tolerated. Actually, many listeners barely detect distortion due to clipping of modulation peaks when a limiter is set to clip as low as 30 to 40 percent modulation. It has been determined that this is about the overall percentage of modulation of signals usually encountered. A little thought will show, however, that where speech clipping or automatic speech level controls are used in the transmitter being received, a fixed-level noise limiter set for effective limiting for the majority of incoming signals might cause some bad distortion of signals having high average modulation percentages.

The basic reason for setting the limiter to the average percentage of modulation rather than at 100% is so that it can bring all the noise peaks down close to the average audio signal level and give the signal a better chance to compete with the noise.

Figure 5 (a) shows a representative shunt limiter suitable for connection between a diode second detector and the first audio amplifier grid. *R1* and *R2* make up the detector load resistor and should total about the same as the value presently in the receiver to be modified. The usual value found here is about 500k. *R4* and *C1* provide the automatic bias for the diode. The product of *R4* and *C1* should be large enough so that the voltage at point *C* in the circuit will not be changed by the audio voltage coming from the detector but not so large that point *C* cannot follow fluctuations due to a fading carrier. *R3* is the series dropping resistor which provides the voltage divider action previously discussed. The value of *R3* should be about equal to the value of the grid leak of the audio amplifier to which the output of the limiter is connected. In most receivers the grid leak also functions as a volume control and *R3* should be approximately equal to the total value of the volume control. The value for the volume control or grid leak in many receivers usually will be about 500k. Too large a value of *R3* with respect to the input resistance of the audio stage will cause a loss of audio voltage and too small a value will decrease the effectiveness of the limiting. A 1:1 ratio of *R3* to audio input resistance will drop the available audio only 6 db (½) and most receivers will have plenty of reserve audio gain to make up for this loss. An audio coupling condenser should be used between the limiter and the volume control or audio grid lead to prevent any d.c. voltage from getting onto the audio grid.

The ratio of *R2* to *R1* determines the percentage of modulation at which the clipping action takes place. Neglecting the internal resistance of the diode, a ratio of 1:1 will cause the diode to clip at 100% (with no a.c. load or with no infinite audio stage grid leak). With a value of *R2* equal to one-half *R1*, clipping will take place at 50% modulation. Where a variable modulation percentage selection control is not used, the author recommends that the value of *R2* be no greater than 40% of *R1* which corresponds to a 40% modulation clipping level. (See *Table I* for typical values to be used for 40% clipping.)

R_3 = 500k	C_1 = 0.05 uf	R_4 = 1.0 Meg	
% limiting	R_2/R_1	R_2	R_1
100%	1/1	250k	250k
50%	1/2	166k	333k
40%	2/5	140k	360k
30%	1/3	125k	375k
0-100%	1/1	250k pot.	250k

Table I. Typical values for 40% clipping.

Taking diode internal resistance into account, the percentage at which clipping occurs will be somewhat greater than 40% on weak signals and will come almost down to 40% on strong signals. Because the diode internal resistance is so dependent upon signal voltage levels as well as circuit constants it has been convenient, in the tables of typical circuit values and in the discussion of the operation of the various limiter circuits, to neglect this factor when figuring the modulation percentage

(Continued on page 60)



A Monthly Department Edited by Louisa Sando, W5RZJ*

In grateful recognition of their outstanding service as amateur radio operators, Frank and Sandy Sarver, W6AOR and W6YRL, have been awarded by the U.S. Marine Corps a Certificate of Appreciation. You can see it in the photo on the top of their desk.

Countless are the hams who have helped GIs in all branches of the service by handling traffic and personal QSOs. Frank and Sandy's work is a particularly shining example in that it's covered some 13 years and in the tremendous volume they've processed. It started back in the '30s when Frank began handling a large amount of traffic from XU8NA, the Marine Corps ham station at Shanghai.

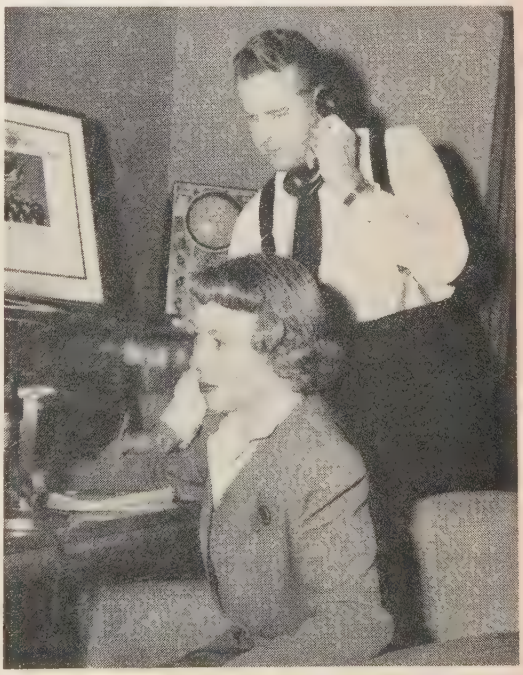
Among the hams at XU8NA were F.A. Martin and Gene Goss. All of the traffic was handled on 40 meters. Frank kept the schedule at 4:00 a.m. every morning seven days a week for over three years. The Sarvers' mail used to come each morning in a stack held by a rubber band so numerous were the messages to be sent to China. Occasionally people would send three-page letters, being ignorant of procedure. Sandy would condense them and then reseal the letters and mail them on to the boys in China—transmitting the important information by air. In those days she did not have a ticket, so "all" she could do was help get the traffic ready each evening. They had an automatic perforator and Wheatstone transmitter at that time, and she'd get it all punched out for the morning schedule. Frank would get up at 4 a.m. and keep the schedule—sometimes the contacts ran until 8 a.m. if band conditions permitted. Then during the day Sandy would type up all the messages he took from China and mail them, sometimes by air, to all parts of the United States.

Naturally, the Marine operators and the Sarvers became good friends, and they finally met personally Dec. 6, 1941, when the operators of XU8NA visited the Sarver QTH. The next day while reminiscing of China days the radio interrupted them with news of the Japanese attack on Pearl Harbor. During the first couple of war years Frank and Sandy saw quite a bit of Martin when he was stationed at Pendleton. He used to visit them almost every week-end and bring a few of the boys. Then they lost track of Martin—he was somewhere in the Pacific, and that's all they knew.

Sandy got her own ticket in January of 1947, and one night when Frank and W6PUZ were calling on W6ADP she was tuning the 10-meter band. Frank had just completed the 10-meter transmitter and put up their 4-element wide-spaced beam 65 ft. high on a steel tower. Sandy heard a very familiar voice say, "This is W6YOT/C6 Tsingtao China testing." It was Martin. She called him, signing her own call, and he came back with the usual formalities. When he turned it back and she told him she was W6AOR's XYL he really let out a yell. From then on they had daily schedules until he left China and returned to the States.

For a time Martin was stationed in Arlington, Va., and signed W4NTR, and the Sarvers worked him there. But during that time they handled a good deal of traffic from Okinawa, Guam and Japan for many stations; also quite a bit from Germany.

The outbreak of the Korean conflict found the Marines back in the Orient and the Sarvers again spending long hours at their rig. At JA2MB in the Marine Barracks in Yokosuka, Japan, Frank and Sandy found two old friends to help them. They were Martin and Gene Goss, now a major and in charge of the ham station. The peak traffic came during



Frank and Sandy Sarver, W6AOR and W6YRL, in their ham shack where they've handled so much traffic and so many personal QSOs for men of the Marine Corps that the Corps has awarded them a Certificate of Appreciation.

Address all letters and correspondence to 959C-24th Street, Los Alamos, New Mexico.



All licensed YLs in the Panama Canal Zone have formed the Canal Zone Q R Marys, newest of the YL clubs. From left to right, sitting: KZ5DG (secretary), AC (president), LM (vice president), and standing: CN, NN, BM, KA, GQ, and ML (activities manager).

and after the epic breakout of the First Marine Division at the Chosin Reservoir. Keeping their schedules seven days a week the Sarvers handled an estimated 40% of the six thousand messages processed.

"When Frank is home he always handles the schedules—when he's at work (sound engineer at RKO), I do," says Sandy. "And that makes it nice because the boys always know there will be someone here to keep them. That is seven days a week during the 10-meter season. Martin has always had first call on this station. We would clear him of everything coming this way and then very often just leave the receiver on his frequency in case someone else came into his shack who wanted to reach home. Lots of times I have been in the middle of ironing or cooking dinner when Martin would call. All he'd say was, 'W6AOR—still there Sandy?' and I'd run like mad and throw the switch and say, sure.

"The bulk of our traffic was either mailed, phoned, or wired. On a few occasions I passed some on to the Mission Trail Net. Sometimes we would clear them direct ourselves on 10 in the morning. WØCZE used to stand by lots of times to see if we had anything for St. Louis. I remember one afternoon I was working JA2HQ and he had rush traffic for St. Louis. I relayed to WØCZE, he phoned the message and got an answer which I sent to Japan all in less than ten minutes. All of which speaks well for ham radio."

The Sarvers' story was dramatized on the "Marines in Review" program over the ABC network on April 29th. The whole half hour was dedicated to amateur radio and the last half was the story of their activities with the Marine Corps. At the end of the program Brig. Gen. J. C. McQueen, USMC, Director of Public Information, read a letter to the Sarvers telling them of the award. There was a roll of drums and he read the Certificate: "United States Marine Corps—In grateful appreciation to Mr. and Mrs. Francis M. Sarver for cooperation and assistance so generously extended in maintaining and furthering the interests and activities of the Marine Corps, and for demonstrating the spirit so necessary to the success of the national defense. Your individual efforts will stand as an outstanding example of initiative, devotion and loyalty to the best interest of our Corps and of our Nation." Signed, Lemuel C. Shepherd, Jr., General USMC, Commandant of the Marine Corps.

"It was one of the greatest thrills of our lives!" say Frank and Sandy.

To which we can only add, well done, and congratulations!

New YL Club

Congratulations and welcome to the newest YL club to be formed. Known as the **Canal Zone Q R Marys**, the club includes all of the presently licensed YLs in the Panama Canal Zone—nine to date. **KZ5AC**, Angela Combs, has been elected president; **KZ5LM**, Lois Magner, vice president; **KZ5DG**, Grace Dunlap, secretary; **KZ5ML**, Martha Lerchen, activities manager. All of the gals operate 10-meter phone, and those who don't work during the day usually are to be found any afternoon the band is open about 100 kc apart. The poor OM who happens to have a day off probably wishes the gals would go back to their housework!

Of the Q R Marys, **KZ5AC**, Angie, was the first to be licensed in the Canal Zone, getting her ticket in July, '49, just one month after her OM got his. Angie, who was born in the Zone, holds down a job with the Army so hamming is confined to week-ends when she shares the rig with her OM, KZ5PC, and daughter Carol, KZ5GQ. Favorite frequency is 29.130; she also operates in MARS. Daughter Carol, **KZ5GQ**, was the first teenager to get her ticket and is still the youngest operator in the Canal Zone. She is a freshman in high school. Son Bruce is getting interested and this may soon be another all-ham family. A lot of you will be seeing the Combs family in person for they're taking off for a Stateside vacation, with plans to visit about fourteen different states, and of course plenty of hams along the way, as well as the West Gulf Division Convention in Corpus Christi the end of June.

KZ5LM, Lois Magner, was the second YL in the Zone to receive her ticket, going on the air only a couple of months after Angie. She also is in MARS. Hailing from Washington, D.C., Lois operates as W4UPJ when in the States. She and OM KZ5NM have three jr. ops.

KZ5ML, Martha Lerchen, born in the Canal Zone, is the XYL of KZ5FL. They have two jr. ops, one being KZ5LF, aged 16. Martha works on 28.640 or 28.960 and

(Continued on page 68)

Ionospheric Propagation Conditions

Forecasts by GEORGE JACOBS, W2PAJ*

After a wait of almost five years the amateur 15 meter band is now a reality. Now that many of us have already become somewhat familiar with the band during the past two months, it is of considerable interest to determine just what kind of band 15 meters will be in the future. How good will it be for DX? Can it be used for short haul QSO's? Will there be much sporadic E propagation on this band, etc?

To answer these questions and to determine just what we can expect from this band, a special propagation analysis was undertaken. The results of this analysis will be presented in this and the August issue of *CQ*.

Basic propagation data used in this analysis was obtained from the Central Radio Propagation Laboratory of the National Bureau of Standards, and appears in the CRPL Series-D Publications and in National Bureau of Standards Circular 462.

From a DX viewpoint, 15 meters is going to be a good band. There are indications that for certain DX paths it may be the best DX band we have. During the next year or two its DX characteristics will be similar to the ten-meter band during the period of high sunspot activity, 1947—1950. The 15-meter band should give amateur radio a worthy replacement for the loss to nature and the sunspot cycle of the 10-meter band. Some DX activity can be expected on 15 meters right through the sunspot minimum years of 1954 and 1955. It is expected to be a hot DX band as solar and ionospheric activity increase around 1957.

In determining the usefulness of the band for various DX circuits, we must make a study of maximum usable frequencies (MUF) and absorption. It is these two factors that determine whether the electromagnetic energy radiated by an antenna reaches a far distant point.

Ionospheric absorption is due principally to the action of the sun. Ultra-violet rays emitted by the sun are thought to be the ionizing agent that produces the various layers of the ionosphere. The ionosphere consists of free electrons and molecules of gas. As a radio signal passes through the various layers of the ionosphere, the free electrons are set into motion. These free electrons, under certain conditions, will collide with the gas molecules, and, during collision, lose some energy. This energy comes from the electromagnetic radio wave, which thus loses it and becomes absorbed or attenuated. The amount of energy lost by the wave depends on the number of collisions made per second and is a function of frequency. As frequency is increased, the motion imparted to the free electrons of the ionosphere is less and the number of collisions occurring per second is also less than at lower frequencies. It has been determined, and this is very important, that high frequency ionospheric absorption is very nearly inversely proportional to the square of the frequency. This means that the higher the frequency we transmit on, the lower the absorption, and all other factors being equal, the stronger will be the field intensity of the received signal. Ionospheric absorption at 15 meters is one-half that at 20 meters and almost one-ninth that at 40 meters. Therefore, from the standpoint of signal strength, 15 meters will give us much stronger signals than 20 or 40 meters.

The maximum usable frequency (MUF) of a particular circuit is the highest frequency that can be used for effecting communications for the circuit. Frequencies above the MUF will either be lost in outer space, or returned to earth at a more distant point. Since daily value of MUF's are subject to considerable variation due to variations in the iono-

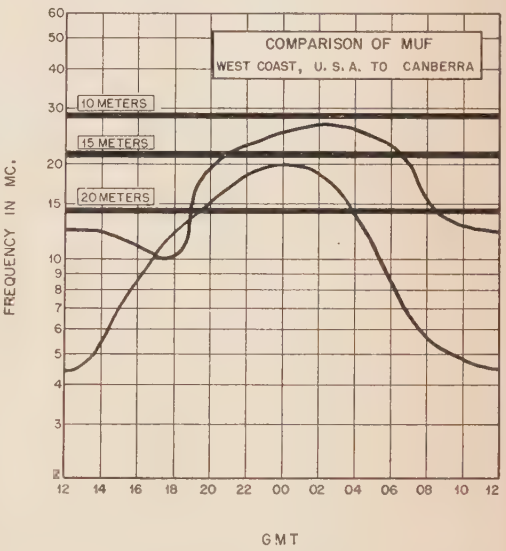


Fig. 1. Circuit analysis on a West Coast USA to Oceania terminals.

sphere itself, the monthly median value of MUF for any particular circuit is by definition the highest frequency that can be used for at least half the days of the month.

The MUF of a circuit is determined by the degree of ionization in the ionosphere. For a particular circuit it may vary hourly, daily, seasonably and throughout the sunspot cycle. Since it requires less ionization to produce an MUF of 14 mc than it does

(Continued on page 32)

**Address all correspondence to 3620 Bedford Ave., Brooklyn 10, N. Y.*

EAST COAST TO: (Centered on Washington, D.C.)	10 Meters	15 Meters	20 Meters	40 Meters
		ALL TIMES IN G M T		
Scandanavia	Nil	Nil	1100-2100 (1-2) 2100-0030 (3)	0200-0330 (1)
Great Britain & Western Europe	Nil	Nil	1100-2100 (2-3) 2100-0030 (3-4)	0300-0500 (2)
Balkans	Nil	Nil	1100-1900 (1-2) 1900-0100 (3)	0100-0400 (1-2)
Central Europe	Nil	Nil	1100-2000 (2) 2000-0100 (3-4)	0300-0400 (1-2)
Southern Europe & North Africa	Nil	2000-2230 (1-2)	1000-2100 (2-3) 2100-0130 (3-4)	0100-0500 (2-3)
South Africa	Nil	1630-1800 (2)	0500-0700 (1) 0930-1900 (0-1) 1900-2130 (1-2)	0200-0500 (2)
Near East	Nil	Nil	1100-2000 (1) 2000-0100 (2-3)	0100-0300 (1-2)
Central America & Northern South America	Nil	1600-2200 (2-3) 2200-0200 (3-4)	1100-1400 (3-4) 1400-2300 (3) 2300-0500 (4-5) 0500-0700 (3)	0000-0900 (3-4)
South America	Nil	1300-0100 (3-4)	1000-2200 (1-2) 2200-0600 (4-5) 0600-1000 (1-2)	0100-0900 (2)
Hawaii	Nil	0100-0300 (2)	1500-0300 (1-2) 0300-0600 (3)	0500-1000 (2)
Oceania	Nil	2300-0200 (2-3)	2100-0200 (1) 0200-0700 (3)	0600-1100 (1-2)
Guam	Nil	Nil	1330-1600 (1-2) 1600-0230 (1) 0230-0430 (2)	0830-1130 (1)
Japan	Nil	Nil	1300-1600 (1-2) 1600-0200 (1) 0200-0400 (1-2)	0800-1000 (0-1)
India	Nil	Nil	1700-0000 (0-1)E 1500-1800 (0-1)A 0000-0200 (1) E	Nil
Philippine Islands & East Indies	Nil	Nil	1130-1400 (2) 1400-0000 (1) 0000-0200 (2)	Nil
West Coast USA	Nil	1800-2300 (1-2)	1500-0000 (2-3) 0000-0400 (4)	0300-0800 (3-4) 0800-1200 (2-3)
CENTRAL USA TO: (Centered on St. Louis, Mo.)	10 Meters	15 Meters	20 Meters	40 Meters
		ALL TIMES IN G M T		
Great Britain & Western Europe	Nil	Nil	1200-2130 (1-2) 2130-0030 (3-4)	0230-0530 (2)
Central Europe	Nil	Nil	1200-2200 (1-2) 2200-0100 (3-4)	0300-0500 (1-2)
Southern Europe & North Africa	Nil	2100-2230 (0-1)	1200-2200 (2-3) 2200-0130 (3-4)	0200-0600 (2)
South Africa	Nil	1600-1800 (1-2)	1000-1900 (0-1) 1900-2200 (1-2) 0500-0700 (1)	0100-0500 (2)
Central America & Northern South America	Nil	1700-0200 (3-4)	1200-1500 (3-4) 1500-0000 (3) 0000-0800 (4-5)	0100-1000 (3-4)

CENTRAL USA TO: (Centered on St. Louis, Mo.)	10 Meters	15 Meters	20 Meters	40 Meters
		ALL TIMES IN G M T		
Hawaii	Nil	0100-0300 (2)	1500-1700 (2) 1700-0400 (1-2) 0400-0630 (3-4)	0500-1200 (2-3)
Oceania	Nil	2300-0400 (2-3)	2000-0500 (1) 0500-0900 (2-3)	0700-1200 (2)
Japan	Nil	Nil	1230-1500 (2) 1500-0500 (1-2) 0500-0900 (2-3)	0930-1200 (1-2)
Philippine Islands & East Indies	Nil	Nil	1300-1700 (2) 1700-0400 (1-2)	Nil
India	Nil	Nil	1200-1400 (1-2)A 1800-0000 (0-1)A 2300-0200 (1-2)E	Nil

WEST COAST TO: (Centered on Sacramento, Calif.)	10 Meters	15 Meters	20 Meters	40 Meters
		ALL TIMES IN G M T		
Europe	Nil	Nil	1400-2300 (1-2) 2300-0200 (2-3)	0500-0800 (0-1)
South Africa	Nil	Nil	0500-0700 (2) 1300-2100 (0-1) 2100-0200 (1-2)	0300-0600 (1-2)
Central America & Northern South America	Nil	2000-0300 (2-3)	1300-0300 (3-4) 0300-1000 (4-5)	0400-1000 (3-4)
South America	Nil	1900-0330 (3)	1300-0100 (2) 0100-0900 (4)	0300-1000 (2-3)
Hawaii	Nil	0000-0500 (3)	1600-1800 (4) 1800-0200 (3-4) 0200-0600 (5) 0600-1100 (2-3)	0500-1200 (3-4)
Oceania	2300-0400 (1)	2100-0600 (2-3)	1900-0400 (1-2) 0400-0900 (2-3)	0500-1400 (2-3)
Japan	Nil	2100-0000 (1) 0600-0800 (1)	1600-0600 (2-3) 0600-1000 (3-4) 1000-1400 (2-3)	1000-1200 (1-2)
Philippine Islands & East Indies	Nil	0400-0700 (2-3)	1500-2100 (3) 2100-0900 (1) 0900-1500 (1-2)	1200-1300 (0-1)
Alaska	Nil	0400-0700 (2)	1600-0500 (3-4) 0500-1000 (4)	0600-1400 (3-4)
Marshall Islands	Nil	0100-0600 (2)	1600-0600 (2-3) 0600-1200 (3-4)	0700-1400 (2-3)
Guam	Nil	0200-0630 (2)	1500-1900 (3) 1900-0700 (1-2) 0700-1200 (2-3)	1000-1130 (2-3)
India	Nil	0300-0600 (1)	1400-1600 (2-3) 1600-0700 (0-1) 0700-1000 (2)	1200-1330 (0-1)

Symbols for Expected Percentage of Days of Month Path Open:

(0) None (1) 10% (2) 25% (3) 50% (4) 70% (5) 85% or more

Special Note: The letter "A" appearing after the expected percentage figures is used to denote that the angle of signal arrival will probably be best over the "Asiatic Path." The letter "E" denotes an azimuth favoring arrival over the "European" path.

to produce 21 mc, 20 meters can be propagationally useful considerably more hours per day and months per year than will 15 meters. By the same token 15 meters will open for far greater periods of time than will 10 meters. During times of day when the MUF is above 21 mc, both 15 and 20 meters may be open simultaneously, when this is so, as previously explained, 15 meters should be the better of the two bands because of considerably less signal absorption.

It requires a relatively large amount of ionization to create an ionosphere intense enough to reflect a frequency of the order of 21 mc. Since the sun is thought to be the ionizing agent, 21-mc transmission, for the most part, will be possible only during daylight hours. Year round openings should be possible on North-South paths to Central and South America and Oceania. East-West DX will for the most part be possible during the Fall and Winter months.

The following table should be useful for determining how many months a year the MUF exceeds 21 mc for certain paths, and can also be used for a comparison between the usefulness of the 15-meter and 10-meter bands for the next year.

1952	Peak MUF Washington, D. C. Tangier	Peak MUF St. Louis Rio de Janerio	Peak MUF Sacramento Canberra
March	23	30	32
April	22	31	33
May	21	28	31
June	21	25	28
July	20	24	27.5
August	19.5	27.5	26
September	21	28	27
October	28	29	32
November	29.5	29	32.5
December	28.5	27.5	28.5
1953			
January	26	25	25
February	26	28	30
Total Months 15 Meters Usable	10	12	12
Total Months 10 Meters Usable	3	7	8

Figure 1 illustrates some of the other factors we have discussed. The figure is a circuit analysis chart for a West Coast USA to Oceania path. Notice that the MUF for this circuit does not quite reach 28 mc, so very little possibility exists for any 10-meter openings. Fifteen meters should open at 2100 GMT (1:00 p.m. PST), and remain open until 0630 GMT (10:30 p.m. PST), a total of 10½ hours. The absorption or LUF curve for this circuit is below the 15-meter band, although it approaches it between 2300—0100 GMT. For the most part, therefore, 15-meter signals should not be badly affected by ionospheric absorption. Twenty meters is below the MUF between 1900 GMT (11 a.m. PST), and 0900 GMT (1:00 a.m. PST), or a period of 14 hours, which is a considerably longer period of time than 15 meters is open. The LUF curve however, from about 1900 GMT to 0400 GMT, is above the 20-meter band (but below the 15-meter band). This indicates that absorption is high enough to considerably attenuate 2 meter signals and on many days the circuit will not be possible or signals will be considerably weaker than 15 meter signals. In other words, considering MUF and ionospheric absorption, 15 meters should usable, with good signal intensities for about 8 hours a day while 20 meters will be usable for on 5 hours a day. On long circuits of this type, 15 mete at least for the next few years, should be the be DX band available to amateurs. The factor of le ionospheric absorption on 15 meters is also an a vantage to low power operators. It means that lo power on 15 will in many cases do a job that w require considerably higher power to accomplish c 20 meters.

Next month, I will continue this analysis of th 15-meter band, discussing short-haul, Sporadic E an Ground-Wave transmission.

No severe ionospheric disturbances are expected during the month of July. Below normal conditions may exist on July 1-2, 20-24 and 27. Above average conditions are expected during July 4-6, 8-9 and 30-31.

General Propagation Conditions July, 1952

EUROPE

No ten meter openings are expected until next Octobe . . . The peak values of MUF between Europe and th USA are approximately 19.5 mc during July. This mea not many openings are expected for 15 meters exce possibly for an occasional erratic opening to South We Europe from Eastern USA on propagationally good day Signal levels will be weak, QSB heavy. . . .

Conditions on 20 meters should be about the same a they were in June. On many days the band will open a early as shortly after local sunup, but high absorptio will keep signal intensities low until late in the afternoo Circuits should be possible from all sections of the US to all areas of Europe. . . . High absorption and increase atmospheric noise levels will limit the usefulness of 4 and 80 meters for DX to Europe, but some "all dark openings can be expected on propagationally quiet night

SOUTH AMERICA

Maximum usable frequencies are not expected to g above 24 mc, on these circuits and no ten meter opening are expected except possibly for a very occasional erratic opening from the South Central section of the USA. . . Fifteen meters should provide some good reliable DX ci cuits from all countries of South America to all areas o the USA. . . . Twenty meters is expected to be open almos around the clock, but high daytime absorption will no permit strong signal levels until very late in the after noon, one or two hours before local sunset.

Forty meters is expected to open fairly regularly be tween all areas of the USA and Central America an Northern countries of South America. Less frequent open ings of a more erratic nature are expected for eighty Both 40 and 80 meter circuits are "all dark" paths an will open after local sundown and before local sunrise

AFRICA

No ten meter openings expected. . . . Some 15 mete openings possible from Eastern and Central USA to Cen tral and South Africa. Openings may be erratic, character ized by weak signals and deep fades. . . . Summer absorp tion and high noise levels will not permit many daytim 20 meter openings between the USA and Central an South Africa and 20 meter DX on these circuits will b considerably poorer than they had been during the Sprin months. . . . Some 40 meter openings are expected, bu not too many DX possibilities to Africa are expected o 80 meters until Fall.

AUSTRALASIA

The daytime peak value of MUF between the West Coas USA and Australia is approximately 27.5 mc. Occasiona ten meter openings may occur on propagationally good days, but 10 meter DX possibilities on these circuits ar becoming quite poor. No ten meter openings expected fro the Central or Eastern sections of the USA. . . .

I may be a bit optimistic on the possibilities of 15 meter to Australasia, but circuit analysis indicates that fairly good openings can be expected between all areas of the

(Continued on page 62)

Men of Radio

WILLIAM R. WELLMAN

PART II

Situated as we are in mid-century and surrounded by a multitude of such developments as radar, television and world-wide communications, it is often difficult for us to realize that radio communication is only fifty years old and became a commercial reality, appropriately enough, just at the turn of the twentieth century.

Of course, much of the groundwork for the new industry had been laid by Hertz and others during the 1880's, but the real test of the value of the art, the utilization of radio waves for long-distance signaling, came toward the end of 1901.

Many things of great importance had taken place during that year. In September, Theodore Roosevelt entered the White House, succeeding the murdered McKinley. The Boer War was making headlines that year, and thousands of people were heading hopefully for Nome, Alaska and the great gold rush.

Guglielmo Marconi

On a hill in Newfoundland that December, another event was taking place; one that was destined to materially alter the future of commerce and industry and to effect profoundly the mode of living of everyone. An observer that December day might have seen a small group of men struggling to control the flight of a large kite, sent aloft from a rocky eminence at the entrance to St. John's harbor.

Trailing from the kite there is a wire which enters a nearby building. Inside, a young man is concentrating upon an assortment of electrical apparatus arranged on a table before him. As noon approaches, his expression becomes more intent. Twelve o'clock passes, then twelve-thirty. Very soon now, the strain will be over and he will know whether his work of the past six years will be climaxed by a supreme triumph. Tomorrow the newspapers of the world will either note that the young man has performed another of his interesting experiments or will hail him as a benefactor, the creator of a new mode of communication.

He continues to wait, a telephone receiver held tightly to his ear. Suddenly he hears something; three faint clicks in the receiver, repeated several times. There can be little doubt that his experiment has succeeded, yet he is ever the cautious scientist. Passing the receiver to his assistant for confirmation, he asks: "Can you hear anything, Mr. Kemp?" Kemp nods, indicating that he too has heard the three faint clicks. Thus was accomplished the twentieth-century miracle of long-distance wireless communication. The waves had spanned the Atlantic, traveling 1700 miles from Cornwall, in England. Since that time, countless numbers of children and students have asked parents and teachers the question: "Who invented radio?" and have received the answer: "Marconi."

To be technically correct, Marconi did not "invent" radio. But he did produce the first commercially practicable system of wireless communication over long distances. His accomplishment was not the result of any single discovery or invention, but comprised, instead, the refinement and the adaptation to his purposes of existing apparatus: Hertz's wave generator, Branley's coherer and his own ideas of an antenna and ground system.

Guglielmo Marconi, born April 25, 1874 at Marzabotto, near Bologna, Italy was the son of Giuseppi Marconi, a local banker, and Anna Jameson of Dublin, Ireland. Anna was the daughter of Andrew Jameson of the famous whiskey distilling family. She had met and married Giuseppi while studying music in Bologna.



Courtesy Harper & Brothers

Guglielmo Marconi (1874-1937)

As a child, the future great man of radio was rather lonely, had few friends. Perhaps this was because he had already developed a serious turn of mind that set him apart from other boys, or perhaps it was because of a language barrier. Although he was Italian-born, he was not too proficient in the language, and his few comrades ridiculed his accent; this was because his mother had always conversed with him in English.

Young Marconi attended no schools, but received all of his education under the guidance of private tutors in Italy and in England. To compensate for his lack of friends, he turned to books for companionship and soon became interested in science. At

the age of twenty he had made a study of Hertz's experiments, became deeply interested and promptly decided that the waves could be used in sending messages over long distances.

For a start, he merely duplicated Hertz's equipment and techniques and his first few trials were failures. He carefully studied his apparatus and procedure, found where his errors lay and after corrections had been made was able to send and receive messages over the length of the house.

He soon realized that further experimentation would take more money than he had; the next step was to interest his father. At first, Giuseppe was skeptical, but after witnessing a few demonstrations agreed to finance his son to the extent of about $1,000. This was an extremely critical phase of Guglielmo's career, since it is probable that he would not have been able to continue experimenting without financial aid and it might have been difficult for him to interest investors in his scheme.

As noted earlier, his first experiments were based upon Hertz apparatus, including the spark coil generator and a spark gap provided with extended rods that functioned as antennae. At this juncture he made some changes in the apparatus that resulted in a startling improvement in results. Dispensing with the rod antennae, he now connected one terminal of the gap to an elevated antenna, consisting of a copper cylinder mounted on a tall mast. The opposite terminal of the gap was connected to the earth. It is interesting to note that for many years thereafter, the elevated antenna, together with the ground connection, remained a necessary part, and indeed a symbol of radio. A grounded antenna is referred to, even today, as a Marconi antenna. There was to be sure, a return to the Hertz antenna, but this was many years later. The grounded antenna, then, may be regarded as Marconi's first contribution to radio.

Although his antenna had materially extended the range of his apparatus, Marconi soon realized that there was little hope of real long-distance communication without an improved receiving syste Hertz's receiving loop was far too insensitive. Sc he learned of the little tube of filings invented Branly and used by Sir Oliver Lodge, and felt th this device, combined with his antenna system, fered real possibilities. Again his genius for refini and improving came to the fore; Branly's tube w made narrower, the metal plugs placed closer gether and nickel and silver filings substituted the original iron with the result that he was th able to receive signals from a mile away, with transmitter located on a distant hill and the recei at the house. Almost as important as the impro ment in the range was his discovery that sign could be picked up when the transmitter was plac on the far side of the hill, thus proving that waves were capable of passing through obstacl

Despite his success and the steady increase range, Marconi's work had thus far attracted lit attention. Aside from his family, Professor Rig of the University of Bologna and a few others, one seemed to be interested. Yet the inventor w certain that his system had commercial, perha even military value. With this in mind, he offer the results of his research to the Italian gover ment, but the offer was declined.

Disappointed, but not discouraged, he reason that his discoveries should be of greatest impo tance to a nation with broad maritime interes Even at that early date, wireless seemed bound the sea. The logical choice among world powe was, of course, England. This was dictated n alone because of England's naval and maritir power, but partly by the fact that his mother h influential friends in that country.

He arrived in England carrying letters of intr duction to a number of important personages, i cluding one to Sir William Preece, technic director of the British Post Office. In his positic Preece was responsible for the British telepho and telegraph network, and had once experiment with a form of wireless; the cable extending fro

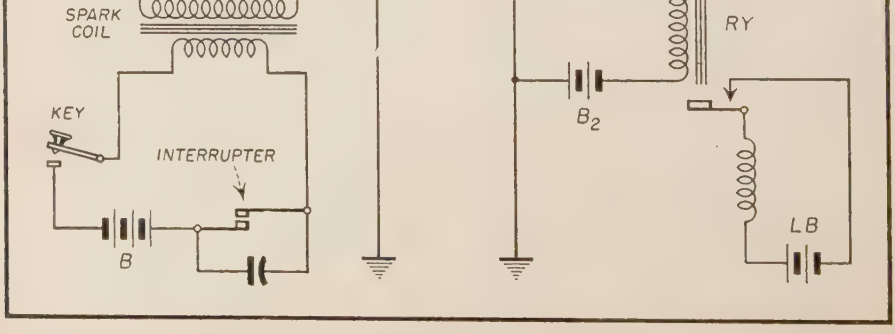


Fig. 1. Early Marconi transmitter and receiver.

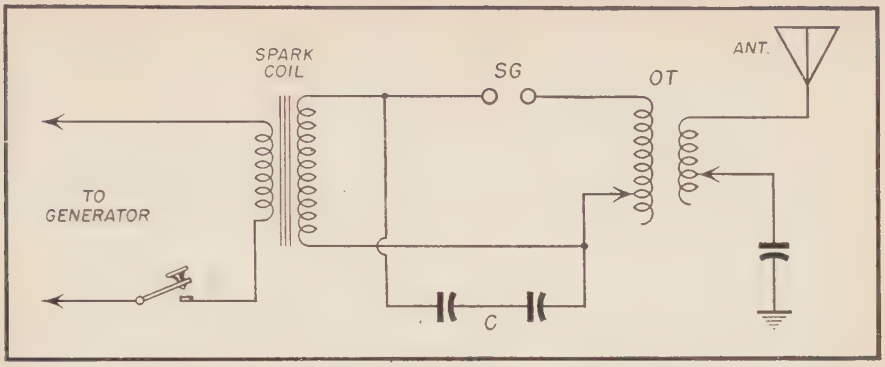


Fig. 2. Later Marconi Apparatus.

the island of Mull to the mainland had parted and by laying parallel wires along the opposite shores Preece had maintained communication through a form of induction telegraph.

Marconi's arrival in England was attended by a rather serious incident that also had a humorous side. A customs inspector, upon examining his instruments, decided that they must be bombs or infernal machines and ordered that they be destroyed. The result of this stupid act was that the progress of radio was delayed for some weeks, until duplicate apparatus could be obtained.

Once established in England with his equipment, Marconi began a long series of experiments in communication over open stretches of country and congested city areas. Once more, it was clearly established that Hertzian waves were capable of passing through most ordinary obstacles. Shortly, the range was extended to nine miles. Just then, his work was almost interrupted by a notification from the Italian government, calling him to military service. Of course, he might have avoided service by renouncing his Italian citizenship and becoming a British subject, but he did not choose to do this. Finally the situation was clarified by an arrangement which permitted him to continue his work as a military student attached to the Italian embassy.

On July 20, 1897, the first company, Wireless Telegraph and Signal Company, Ltd., was formed to acquire and develop his discoveries; Marconi became its chief engineer. Three years later the name was changed to Marconi's Wireless Telegraph Company, Ltd. and for many years thereafter the firm enjoyed a virtual monopoly of wireless communication on both sides of the Atlantic.

One of the first projects of the new company was the installation of apparatus in lightships and lighthouses, at the direction of Lloyd's Corporation. Two lighthouses, seven miles apart, were selected for the initial test, with gratifying results. This was probably the first practical application of wireless in history. The next year equally good results were obtained between a fixed shore station and a moving vessel while 18 miles at sea.

In 1899 the French government invited him to conduct a cross-channel test which was highly successful. Newspaper reporters who witnessed the test gave Marconi much valuable publicity, a fact which probably was quite instrumental in directing public attention and support toward his ideas. Later that year, he clinched public acceptance of wireless communication by sending the results of the international yacht races from a tug, stationed at the Sandy Hook race course, to shore, probably the first instance of the use of wireless in covering a sports event. As the Shamrock and the Columbia, contenders for the famous American Cup sailed the course, Marconi followed, reporting the series in detail, transmitting hundreds of individual reports to shore. The Shamrock, entry of Sir Thomas Lipton, tea magnate and grand old man of yacht racing, lost the event.

During his visit to the United States, Marconi conducted a series of tests for the War and Navy departments; these tests eventually led to the adoption of his system by the military and naval services of a number of world powers.

Now only twenty-five years old, Marconi was well on the way toward international recognition as a scientist, but although he was the leader he was not the only one in search of a commercially acceptable method of wireless communication. The science had progressed to the point where signaling over a 200 mile range was feasible and a race had begun, to extend the range and improve reception. Among those pitted against him in this race were DeForest and Fessenden in the United States and Slaby in Germany. The Russian, Popoff, had achieved notable results as had Bose in India. But Marconi managed to keep far ahead of the field and as early as 1900 decided that even the Atlantic might not prove to be a barrier to wireless. His principal concern, however, continued to center upon communication between ships at sea and shore stations; he visualized powerful land stations on both sides of the ocean having a range great enough to maintain contact with a ship in mid-Atlantic; in this way, a ship would always be in touch with shore and much of the risk of ocean travel would be nullified.

Aside from more powerful sending apparatus and more sensitive receiving devices, the proper

choice of a wavelength seemed to be very important in long-distance work. Fleming, who later invented the first vacuum tube, advised Marconi to use a longer wave. This was kept in mind when construction of the then most powerful station in the world was begun at Poldhu, Cornwall. According to Fleming, the wave emitted was about 1,000 meters. Another factor that seemed to affect the range of a transmitter was the antenna height; accordingly an elaborate antenna system was erected at Poldhu, supported by twenty masts arranged in a circle. Unfortunately, the impressive aerial was never used. Construction of the station proceeded during the summer of 1901 and in August, just when everything was ready for preliminary testing a sudden storm struck, wrecking the carefully built antenna. It was then too late to begin rebuilding in time for the contemplated trans-Atlantic test; thus it happened that the first wireless signals to span the ocean were radiated from a simple, single wire antenna.

Trans-Atlantic Broadcast

Marconi and his assistant, Kemp, left England at the end of November and began work at St. John's on December 9. The government authorities afforded him the use of a building on Signal Hill for housing his apparatus. Prior to the trans-Atlantic trial, Marconi's receiving equipment included a telegraph sounder, or in some cases a recorder which inked the dots and dashes on a moving strip of paper; in either case, the reproducing device was actuated by the coherer. A telephone receiver was known to be more sensitive and was used in the Poldhu-St. John's test in place of the sounder or recorder.

An interesting point arises concerning Marconi's use of a temporary type of receiving aerial, kept aloft by a kite in preference to a more elaborate installation. Seemingly, a kite antenna lessened his chances of success, but on the other hand the cost of erecting masts and a fixed antenna would have been quite heavy and might have been a severe liability in the event of failure. This, together with the fact that much of the work at Newfoundland was shrouded in secrecy seems to give support to the view that he was not primarily interested in spanning the Atlantic. If he failed in the attempt Poldhu was still ideal for his original project of ship-to-shore communication. It is also possible that the trial was partly a master stroke to demonstrate beyond all doubt that his system was superior to all others.

When all was in readiness the Poldhu operator was contacted by cable and instructed to start sending at 11:30 A.M. and to continue until 2:30 P.M. each day, St. John's time. No complete message was to be sent, just the letter "S," repeated over and over. In the choice of time, it is evident that Marconi was extremely lucky, for it is now certain that darkness would have increased his chances of success. Considering the chosen time, and the temporary nature of his sending and receiving antennas, his success was almost miraculous.

When the first day's test was completed, t results were not immediately announced to go ernment officials and the press. This would ha been the usual procedure, and due to the caref prearrangement there was little doubt that the si nals heard did originate in England but Marco wanted to be sure and waited until a second te had been made on the following day. Perhaps th is one reason why some confusion exists concerni the actual date of the event. Most accounts gi December 12 as the date, but his own statement the press, released under the date of December I states that the first signals were heard on Wedne day, December 11. In spite of his caution and r serve and the emphasis he placed on the embryon state of the wireless art, his attorney said that his opinion Marconi had released the news of th success too early. Evidently the original scheme concentrating on ship-to-shore wireless was ten porarily pigeonholed and the Marconi Compan proceeded with plans for a two-way trans-Atlant link. Of course, the first step in such a plan wa the construction of a permanent station, preferab at St. John's, but this station was destined neve to be built.

Immediately after the news reports appeared, th New York manager of the Marconi interests wa interviewed by the press. One of the question asked was whether he thought wireless would sup plant the land telegraph, and he replied that th was a distinct possibility. Even without such statement, the telegraph companies were alread worried, and the interview resulted in genuin alarm. Some companies took the view that the were threatened with extinction, the value of tele graph and cable stocks dropped alarmingly and fight for survival took shape. One result was tha Marconi was served with legal papers prohibitin him from continuing operations within Newfound land; the basis for this move lay in the fact tha the company initiating the action maintained monopoly over the sending and receiving of tele graph messages in that area and wireless was con sidered a form of telegraphy.

All plans for erecting a permanent station in S John's were abandoned and operations were trans fered to Glace Bay, Nova Scotia.

The new Glace Bay station was ready for opera tion by the end of 1902. In the meantime, many improvements had been made in apparatus and techniques. Lodge had contributed tuning methods which enabled an operator to separate wanted from unwanted signals, based upon his original research in the phenomena of resonance. Marconi had intro duced the magnetic detector, regarded as a valuable improvement over the coherer, earlier in 1902, and the new detector was added to the installation. The first wireless message in the west to east direction was sent on December 17, and the era of commer cially practicable wireless service had begun.

With this phenomenal start, it was not surprising that the Marconi system outdistanced all competi

(Continued on page 67)

My Mobile Antenna

A. J. SPATOLA, W6DAE*

The 75 meter mobile antenna used by W6DAE has two novel ideas that should be of interest to mobileers; one mechanical and one electrical. —Editor.

On corners and fast stops most whip antennas, having their entire weight of the antenna on the spring, flip around like Douglas Fairbanks with a sword. If the *Master Mount* spring is moved from the bottom of the antenna and mounted at about the same height as the top of the car body, then when the antenna hits a tree or something and starts into action it is at a height where the average, dreamy jaywalker is not apt to be swung into the land of nod. The greatly reduced weight on the spring results in virtual elimination of the usual oscillation.

Figure 2 shows the mechanical construction of a special loading coil which allows the whip to be lowered into it a distance of three inches. Even this small amount of adjustability allows the antenna to be tuned over most of the band. The coil form is made from a piece of 7" X 1½" O.D. polystyrene rod (plexiglass or lucite will do as well). One half inch from each end of the rod a 13/64" hole is drilled to a depth of ½" and tapped with a ¼" SAE. Two ¼" brass bolts, ¾" long, with the heads sawed off are drilled lengthwise through the middle and tapped with an 8-32 tap. This operation gives you two bushings which will hold the set screws in the plastic.

Next, drill a hole on the bottom surface of the coil form to a depth of 1¼"; equal in diameter to the size of the shaft of the whip. This hole can be tapped if necessary to mount on the spring. A similar hole is then drilled in the top surface of the coil form to admit the top part of the whip to a depth of 3". Raising and lowering the whip into this hole permits the antenna to be resonated over most of the 75 meter band. Set-screws are put in the brass bushings and, when tightened, hold the antenna firmly. If you intend to QSY often the top set-screw could be made with a butterfly end for operation with the fingers rather than having to carry a screw driver or set-screw wrench with you all the time.

The next step is to wind the wire on the coil form. Number 15 cotton covered was used here. The bushings on each end of the form can be used as terminals for the ends of the coil. When the coil has been pruned it can be covered with phenol or plastic paint so that rain will not bother it.

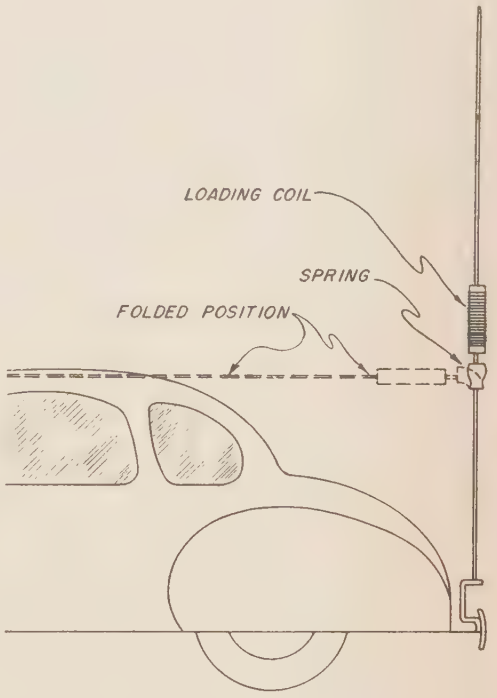


Fig. 1. If you disassemble your Master Mount mobile antenna and put the spring just below the loading coil you will be able to drastically reduce the "layback" and vibration.

The whip is pushed down into the form the full 3" and the coil pruned to 3995 kc by removing turns from the coil. A small transmitter or grid-dip oscillator will indicate resonance. In my particular installation the antenna resonates down to 3850 kc with the whip mostly out of the hole. Notches can be filed on the whip to indicate the resonant frequency adjustments.

For those of you that have not had experience with drilling plastics it is well to point out that this takes a bit of time, care, and a coolant on the drill,

*632 North 15th Street, San Jose 11, California.

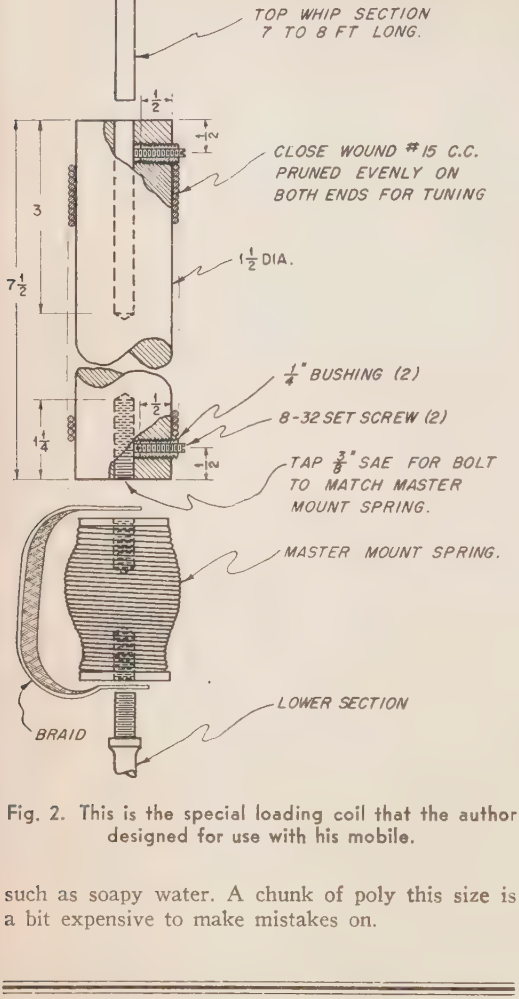


Fig. 2. This is the special loading coil that the author designed for use with his mobile.

such as soapy water. A chunk of poly this size is a bit expensive to make mistakes on.

Improved S/N with FL8

This is a very simple means of improving the signal-to-noise-ratio of any communications receiver employing a crystal filter.

Many amateurs have experimented with the well known FL8 filters, and found that they were somewhat unusable due to their extreme selectivity and consequent ringing. This was very noticeable using the filter in the "Range" position.

However, upon switching over to the "Voice" position, where the filter operates with a rejection frequency of 1020 cycles, a very desirable and noticeable attenuation of the normal crystal "ringing" of the receiver is found. This may be verified by simply switching over to the "Both" position of the filter which is its normal or "out" position.

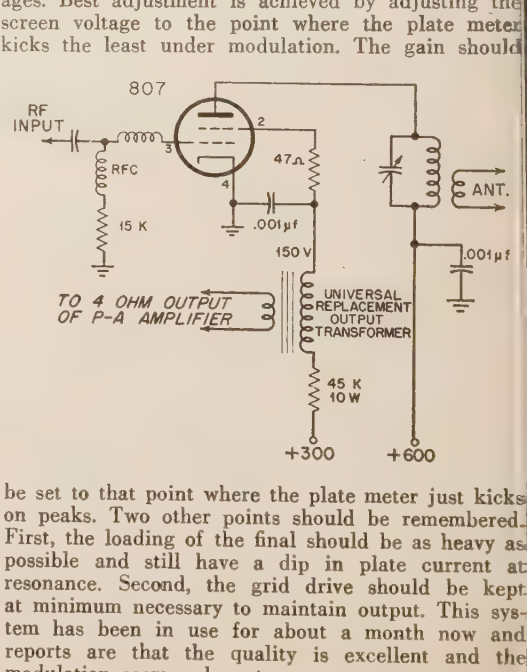
The user will immediately notice that there is no insertion loss detectable by ear, and that a great percentage of the crystal ringing (noise) is rejected.

This gimmick has been in constant use in the writer's receiving set-up for the past two years with a great deal of success. It also offers one the extreme selectivity of the "Range" position when needed and possible to be used. Users are cautioned that an impedence match is necessary for proper characteristics of the filter and no difficulty has been experienced by using any of the common varieties of high Z 'phones found in a ham shack. A 500-ohm speaker winding was tried without success. However a 500-ohm input to the filter does not impair its efficiency.

MARV GONSIOR, W6VFI

A Lazy-Man's Screen Modulator

Wanting to screen modulate my 807 final on 75 meters, but not having enough time to build a clamp tube or screen modulator, I began to look about for another method of achieving this end. The following idea was hit upon and put into operation. A 14-watt public-address type amplifier used here to play records and a universal replacement output transformer from the junk box were all that was needed. The voice coil secondary of the output transformer was attached to the 4-ohm output of the amplifier and the primary of the transformer became the secondary. The screen voltage is dropped to one-half its normal CW value through a dropping resistor and fed through the transformer to the screen. The only thing else that needs to be done is to increase the value of the screen by-pass condenser to .001 μμf in order to pass audio frequencies. If the replacement transformer secondary has taps, they should be chosen to produce a fairly high impedance in the screen lead. Values shown in the diagram are those I used, but are likely to be different with other tubes and voltages. Best adjustment is achieved by adjusting the screen voltage to the point where the plate meter kicks the least under modulation. The gain should



be set to that point where the plate meter just kicks on peaks. Two other points should be remembered. First, the loading of the final should be as heavy as possible and still have a dip in plate current at resonance. Second, the grid drive should be kept at minimum necessary to maintain output. This system has been in use for about a month now and reports are that the quality is excellent and the modulation seems adequate.

JAMES H. SCOTT, W9CWH

Ground Plane Matching Network

WILLIAM I. ORR, W6SAI*

Much of the disfavor with which many amateurs view the ground plane antenna can be traced to improper matching. The author says this can all be cleared away with a fixed variable condenser and a few turns of wire. If you are contemplating some low frequency operation, try a ground plane—properly matched. —Editor.

With the current decrease in the sunspot activity there is a slow but steady shift of amateur operation to the lower frequency bands. An antenna gaining in popularity on these bands is the simple ground-plane vertical shown in *Fig. 1.* It is easily constructed, neat in appearance, and an excellent antenna for DX work on these bands.

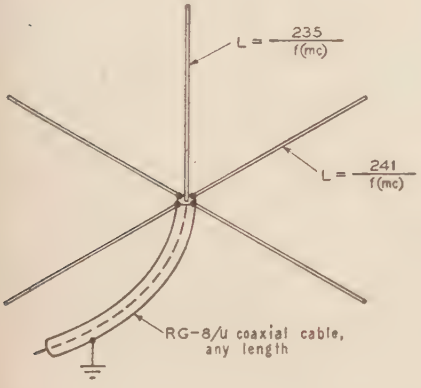


Fig. 1. The usual ground plane consists of a vertical radiator and four radials in a horizontal plane around the base. Although it has a radiation resistance of approximately 32 ohms practically everyone feeds it directly from RG-8/U.

It is practically impossible for the amateur to construct an efficient low angle radiator on the 7 mc band, for example, unless the antenna is vertically polarized. A horizontal array would have to be suspended at least 60 feet in the air to obtain satisfactory low angle radiation for long distance communication. In most cases this height is out of the question. The ground-plane antenna provides this vital low angle radiation and only necessitates a height of 33 feet. Its base can be set directly on the ground if the surrounding area is relatively free of buildings and trees.

Many ground-planes are in use. The chief objection to their more widespread popularity seems to be a reluctance of the antenna to load the transmitter fully. In some cases it will refuse to take any load at all. This fault is caused by the relatively low impedance feed point of the antenna. A ground-plane has a base impedance at resonance of about 32 ohms. Since most amateurs feed their ground-planes with RG-8/U coax, there is a SWR of at least 1.62:1 on the line. If the length of the vertical radiator or horizontal radials is incorrect, the SWR can be even higher. With a SWR of this magnitude the physical length of the coax line becomes a factor in loading. Some fellows prune their line an inch or two at a time until they achieve sufficient loading, which does not change the SWR but merely alters the reactive component at the transmitting end of the line.

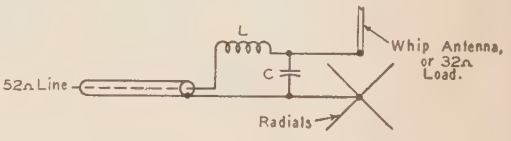


Fig. 2. The "L" network is quite simple.

A much more satisfactory solution, and one that will produce a unity SWR on the coax line, is to use a simple matching device at the antenna end of the line. A simple "L" network that provides a 5:3 transformation will do the trick. The circuit of such a network is shown in *Fig. 2* and suitable constants are tabulated in *Table I.* The condenser may be a 1250 volt (test) mica with a 10% tolerance. The coil may be air wound of heavy wire or wound on a ceramic form. If a coil form is used, the completed coil should be given a coat of clear

*555 Crestline Dr., Los Angeles, Calif.

collodion, or coil dope, to protect it from the weather. This network should be mounted directly at the base of the ground-plane. Prior to installation, the ground-plane should be resonated at an optimum frequency with a grid-dip meter. This will insure that there is a minimum reactive component appearing at the input to the "L" network.

Band	Capacity C (uuf)	Coil L (uh)	Coil Size
80	760	1.14	11 turns #12e, 3/4" diam, 1 3/8" long
40	380	.57	11 turns #12e, 1/2" diam, 1 3/8" long
20	190	.28	6 turns #12e, 1/2" diam, 7/8" long
10	95	.14	3 1/2 turns #12e, 1/2" diam, 1/2" long

Table I

For ordinary use, the constants given in *Table I* will be satisfactory. The purist, however, may wish to alter the constants slightly to provide an exact match. The condenser may consist of a fixed and variable in parallel, while the coil can be made of a surplus rotary inductance. The operation of the network can be easily checked with a coaxial SWR meter.

Using the above formula for the ground-plane dimensions, and this network, it is easy to obtain a SWR of not greater than 1.1:1 over the entire 7 mc band. The use of slightly longer-than-usual radials will help to broad band the ground-plane to a noticeable extent.

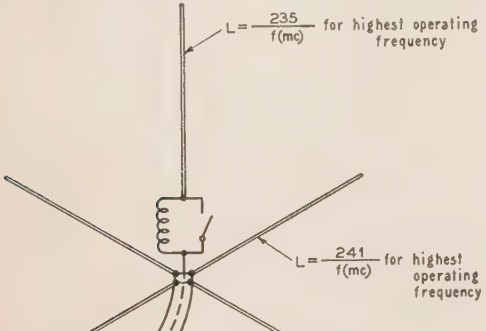
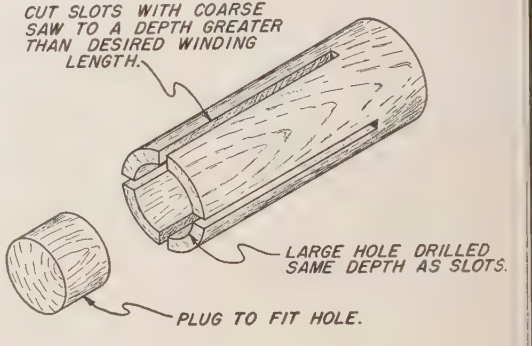


Fig. 3. A method for adding or subtracting sufficient inductance to tune the full 75-80 meter band.

On 75-80 meters the usual ground-plane is too sharply resonant to load over the entire band. If complete coverage is desired, the ground-plane should be cut for some frequency in the high end of the band, and then sufficient inductance added at the base to resonate the antenna at the low frequency end of the band. A switch may be used to add this inductance to the circuit as shown in *Fig. 3.*

Air Wound Winding Form

The simple form for winding your own air core coils shown in the sketch consists of a cylindrical block of wood with a large hole drilled along the axis of the block and two saw cuts made with a coarse saw. Both the hole and the saw cuts must be deeper than the desired winding length of the coil. With a plug cut to fit the hole inserted to hold the form to its original diameter, wind the coil to the desired length and cement it in place with coil cement



(Duco or such). When thoroughly dried, remove the plug and the form will contract due to the saw cuts enough to allow the coil to be removed without damage whatsoever. Three or four thin strips of celluloid cut from a cheap pocket ruler spaced equally around the form make good staves for cementing the windings in place. A heavier strip of poly or the like can then be cemented or clamped on for a base support once the coil has been removed from the form.

At this location, we have forms made up for 2", 1⅝", and 1½", with the hole along the axis drilled the correct size for an old metal tube to be used for the plug. Usually the supply of rolling pins at the local five and dime will produce the correct diameter for these forms.

G. E. VAUGHN, JR., W5RGW.

Fourth Annual Down East Hamfest

The morning of July 26 will witness the inception of another Down East Hamfest, the fourth in a series of festivities presented annually by the Portland Amateur Wireless Association. The center of activity this year will be the Eastland Hotel, and registration there will take place at eleven a.m. PAWA has scheduled the evening banquet, which is the climax of the day's program, for 6:30 p.m. Registration will cost $4.50 per person. Secure your advance registrations from Lee D. Johnson, W1QIQ, 92 William St., Portland, Maine.

Maintaining Mobile Antenna Resonance

W. M. SCHERER, W2AEF*

COVER FEATURE

This is one of the articles that was a "cutback" casualty in the preparation of the our "Special Mobile Issue." Those of you that have heard the "W2AEF Mobile Special" on the air know that this idea is one reason it can get out so effectively. —Editor.

The higher the Q of an antenna, the narrower will be the frequency bandwidth over which satisfactory efficiency may be maintained. In the case of a 4 mc loaded antenna, this may mean a bandwidth of only 20 or 30 kc. For the mobile operator who employs a v.f.o., or who utilizes crystals covering a wide range, some means should then be used for rapidly and conveniently retuning the antenna to resonance from the operating position within the car.

The antenna resonant frequency may be changed either by altering the length of the antenna whip, or by varying the inductance of the loading inductor. The first method is practically an impossibility to accomplish by remote control. Tuning of a center loading inductor would also present extremely difficult mechanical problems, and is virtually in the same class as the first method. Even remote control adjustment of a base loading inductor would be difficult, although not impossible if some means were devised whereby it may be made mechanically strong and may be protected from the weather.

The total antenna inductance may be remotely adjusted, as shown in *Fig. 1*, by employing only partial loading in the antenna itself, and then by making up the difference with a variable inductor mounted in the car trunk.

A unit such as the new B. & W. No. 3852 variable inductor ideal for this purpose, since it may be easily controlled from the dashboard, by means of a flexible tuning shaft.

Referring to the diagram, the inductance of *L2* should be made small, to keep as much of the quarter wave section of the antenna system outside of the car as possible. This will reduce losses at the internal inductor, and at the same time will keep most of the lower impedance, or highest current, portion of the antenna system out in the clear where it has a better chance to radiate. *L1* should be adjusted so that resonance is realized at the highest frequency to be used when *L2* is set for minimum inductance. In order to preserve the Q of *L2*, the tap should be connected so that the unused turns are not short circuited. The initial tuning may be accomplished through the use of a grid dipper, by obtaining the maximum loading at the transmitter, or by checking with a field strength meter for the maximum radiation. If the grid dipper is used, the base of the antenna should be shorted to ground during the measurement. All adjustments should be made with the trunk lid closed.

As the inductance of *L2* is increased, the resonant frequency will be lowered, and a larger portion of the system carrying the highest current will be electrically moved inside the trunk, the inductor losses will go up slightly, and the radiation will also slightly decrease; however, any loss or decrease will be small and, from a practical standpoint, may be considered negligible when compared to the advantage gained by always having the antenna tuned to resonance.

The second method of remote controlled tuning is shown in *Fig. 2*. This is accomplished by means of a variable capacitor which may also be rotated by a flexible control shaft.

The antenna should first be tuned to the lowest desired frequency while both *L2* and *C1* are short

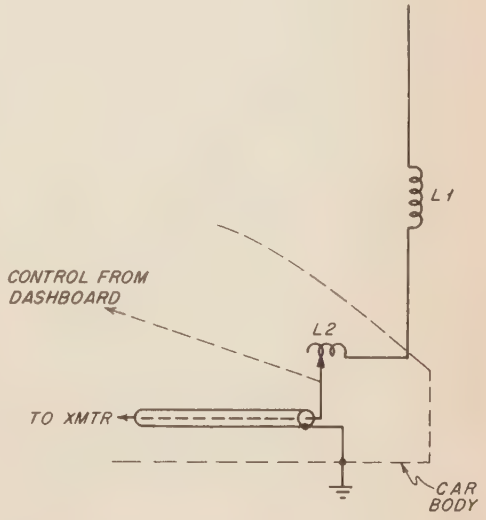
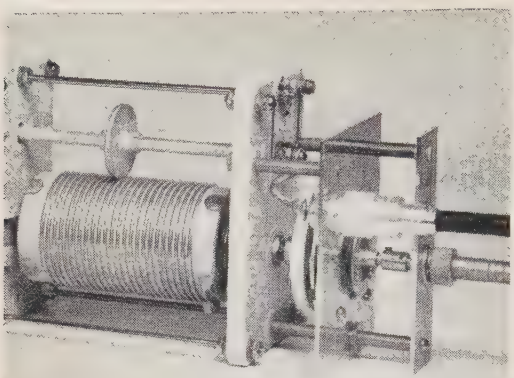


Fig. 1. It is possible to partially load the mobile antenna with a remotely variable inductor mounted in the trunk or luggage compartment.

*Contributing Editor, CQ.



This is a Barker & Williamson type #3852 variable inductor adapted for remote control operation from the dashboard. A National type AN 5:1 ratio planetary drive unit is used to provide smooth control and to reduce the load on the flexible control shaft. An insulated flexible coupling connects the inductor rotor to the drive unit which is attached to a panel mounted on the inductor endplate. A co-ax connector is mounted on the same panel, and it is wired to the slider wheel terminal. A second panel is mounted on the first to hold the fitting which secures the flexible control cable.

The rotor wiper fingers have been removed from the drive end of the inductor both to reduce friction and to eliminate shorting of the unused turns. It was also found necessary to reduce the pressure applied to the slider wheel and to ease the tension at the wiper fingers shown at the left. A terminal of one of these wipers connects to the antenna, and the panel with the co-ax fitting connects to ground.

circuited. *L2* and *C1* should then be reinserted and with *C1* set at maximum capacitance, only enough inductance should be added at *L2* to again produce resonance at the lowest frequency.

An advantage of this arrangement is that, since at the lowest frequency the antenna was tuned without *L2* and *C1*, the lower impedance or highest current section of the antenna is outside of the car. As the frequency is raised by reducing *C1* the low impedance point moves slightly up the antenna. The net result is that a full quarter wavelength of antenna is out in the clear for maximum radiation.

As pointed out by George Brown[1], a certain amount of coupling efficiency may be lost through the use of the tuning capacitor; however, if the size of the capacitor is made large, the loss will be small. A maximum value of at least 700 $\mu\mu$f should be used at *C1*. This may readily be obtained by ganging together several sections of a broadcast receiver capacitor having good insulation. The modified straight line frequency curve of this type capacitor will also make tuning fairly uniform over the range of the band.

At the lowest operating frequency (3.8 mc) with a rear mounted antenna tuned by a variable capacitor and using inductors of good Q, the impedance at the feedpoint, as measured with the *Antennascope*[2] will be found to be a resistive impedance of about 28 to 35 ohms, depending on the individual installation. At the high end of the band (4 mc) the impedance will rise to nearly 100 ohms. The reason for this is that, as mentioned previously, when the frequency is raised, the low impedance point (voltage node) moves up the antenna. The feedpoint is then automatically a greater electrical distance from the center of the antenna (voltage node), and is, therefore, at a point where the impedance is higher. With this arrangement the loading may have to be shifted from one end of the band to the other, since the reflected impedance changes.

Further Notes

When using the variable inductor method, the feedpoint impedance will remain at about 30 ohms over the entire range, since in this method of tuning, the low impedance point, or the center of the antenna, always remains at the ground end. Using either way of tuning, the mismatch with a 52 ohm transmission line will always be within a ratio of 2:1, which is inconsequential where the length of the feedline, as found in mobile installations, is very short in relation to the frequency. For those who may prefer a closer match when the variable inductor is employed, two parallel feed lines, each of 70 ohms impedance may be used.

An important requisite, for this as well as for any other mobile antenna arrangement, is that the car body be made as good a ground system as possible. To do this, all sections of the body should be thoroughly bonded together. This includes the bumper, splash pan, fenders, trunk, chassis, etc. The antenna ground connection, at the bottom of the feedline, should be made positive and direct.

If the antenna is mounted at a place which requires a lead to be run between it and the inside of the trunk, a low capacitance insulator should be used at the feedthrough point.

(Continued on page 66)

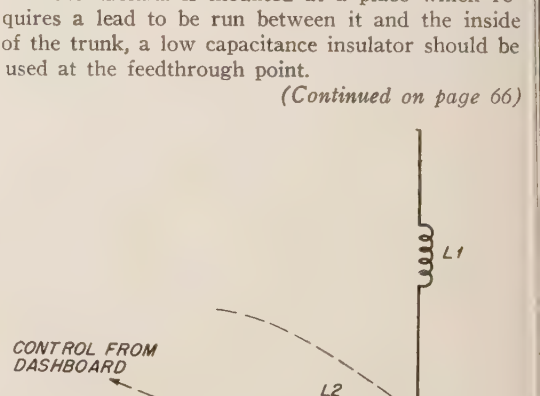
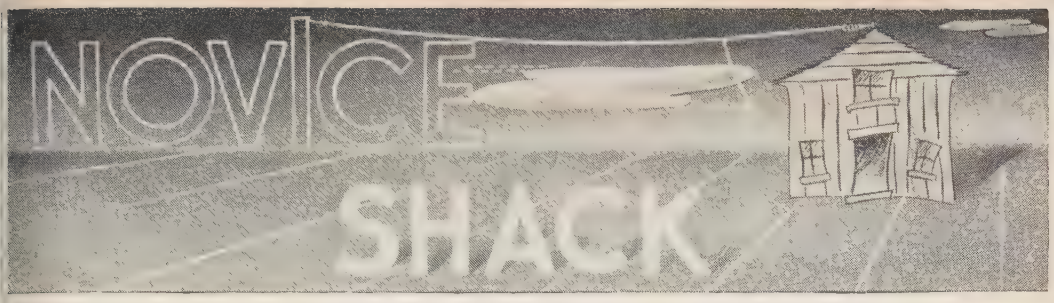


Fig. 2. The same principle shown in Fig. 1 could be applied here by varying the loading through the use of remote tuning condenser.

(1) "High Efficiency Loading Coil for Mobile Antennas," Brown, CQ, Jan. '51.
(2) "Building and Using the Antennascope," Scherer, CQ, Sept. '50.



A Monthly Department Edited by HERB BRIER, W9EGQ*

Good news for Novice operators is the prospect f additional frequencies. The Federal Communi- ations Commission has proposed to permit Novice peration between 7,175 kc and 7,200 kc and to ubstitute 21,150 kc to 21,300 kc for the present 7-mc assignment.

At their annual meeting in May, the Board of irectors of ARRL voted in favor of a 7-mc assign- ent, but recommended that it be 7,150 kc to 7,200 c. They voted opposition to moving the 27-mc ovice band to 21 mc, but they recommended that 51 c to 53 mc be opened to Novice phone and c.w. peration.

It appears likely that Novice operation on 7 mc ill be permitted very shortly, possibly early in uly; however, it may be several months before e divergent views regarding the other bands are econciled and an FCC regulation formulated. In- identally, almost every amateur with whom I have iscussed Novice frequencies believes that the FCC ould authorize Novice operation on all amateur w. frequencies, retaining present Novice License egulations. It would be interesting to hear the pinions of more amateurs on this idea.

Multi-Band Novice Antennas

Half-wave antennas for the centers of the pro- osed new bands are 65 feet 3 inches, 22 feet, and feet long, respectively. Few amateurs, however, ave either the room or the inclination to erect eparate antennas for each band they operate. This s especially true for frequencies below 30 mc. ortunately, one properly-designed antenna can ake the place of several, with no loss in efficiency. lthough certain of the Novice bands are subject o change, it seems that now is the time to give some ata on such antennas, especially when, as far as know, no Novice operator wants an antenna usable nly in the Novice bands.

Figure 1 shows the current distribution and the esulting radiation pattern of an antenna on its undamental frequency (the frequency on which it s ½-wave long) and several multiples (harmonics) f this frequency. Each ½-wave segment of a multi- ave antenna radiates as if it were a simple ½-wave ntenna, but it takes the r.f. current in the antenna a ertain definite length of time (0.5/freq. (mc) sec- nds) to travel from one segment to the next. As a esult, radiation does not occur from each segment t the same moment, resulting in increasing radiation n some directions and zero radiation (a null) in others. (Those who are familiar with Vector Algebra know how differing forces can produce a resultant different from any of the original forces.)

As the antenna becomes longer (measured in wavelengths), the percentage of power in the lobe of radiation closest to the axis of the antenna slowly increases. A 3.7-mc ½-wave antenna, therefore, becomes a rather effective beam antenna in directions approximately twenty-five degrees from the axis of the antenna on 27 mc and 50 mc, where it is seven and fourteen ½-waves long, respectively. Even on these frequencies, the radiation from the minor lobes make it a good all-around radiator.

Center-fed antennas perform differently than end-fed antennas in several respects on even harmonics. Compare *1E* with *1B*. Whereas the currents in each half of the end-fed antenna are out of phase, they are in phase on the center-fed one. This current distribution makes the latter type of antenna act like two antennas in parallel on even harmonics, causing the most significant difference in radiation patterns on the second harmonic. Instead of the clover-leaf pattern of the end-fed antenna, it produces a sharpened version of that from a ½-wave antenna. The sharpening results in not-quite two db gain in its favored direction, compared to a ½-wave antenna,



The neat station of Dick Powell, W8IJM, who recently graduated from the Novice ranks. The transmitter ends up in a pair of 807s. The receiver is a National NC-240D. Dick is fifteen years old and in the ninth grade.

Address all letters and correspondence to 385 ohnson Street, Gary, Indiana.

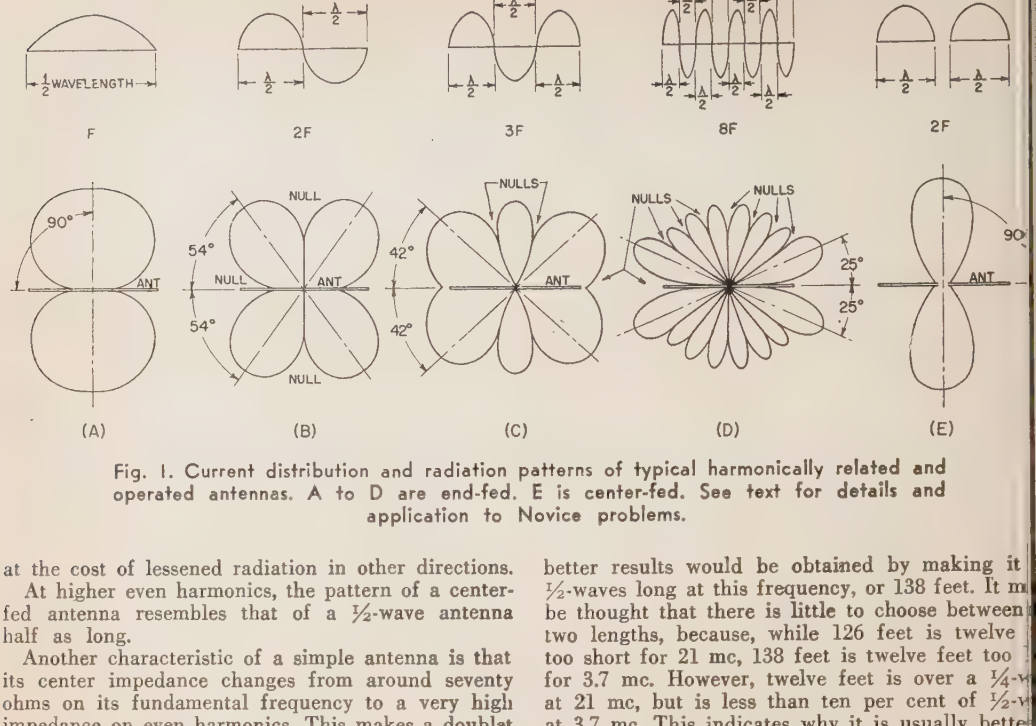


Fig. 1. Current distribution and radiation patterns of typical harmonically related and operated antennas. A to D are end-fed. E is center-fed. See text for details and application to Novice problems.

at the cost of lessened radiation in other directions.

At higher even harmonics, the pattern of a center-fed antenna resembles that of a ½-wave antenna half as long.

Another characteristic of a simple antenna is that its center impedance changes from around seventy ohms on its fundamental frequency to a very high impedance on even harmonics. This makes a doublet fed with a low-impedance feed line or a folded dipole an inefficient multi-band antenna. Either works on odd harmonics; therefore, one cut to a length of 68 feet 5 inches can be used on both 7mc and 21 mc. The folded dipole is to be preferred in this application, because it is more tolerant as to length than the doublet.

Determining The Length Of A Multi-Band Antenna

It takes no genius to discover that there is no exact harmonic relationship between frequencies in the various existing and proposed Novice h-f bands. We also know that, because of so-called "end effects," a ½-wave antenna is approximately five per cent shorter than a ½ wave in space. On the other hand, no matter how long an antenna is, it has only two ends; therefore, a long one is less affected by end effects than a short one. The general formula for calculating antenna length recognizes this fact. It is:

Length (feet) = 492 (*N*-0.05) / Freq. (mc)

Where *N* equals the number of ½-waves on the antenna.

When *N* equals 1, this formula reduces to the familar one used for calculating ½-wave antennas:

Length (feet) = 468/Freq. (mc).

By manipulating the formula, it will be found that a length of approximately 126 feet is resonant near the low-frequency end of the 3.7-mc band as a ½-wave antenna and near the high-frequency end of the 27-mc band as a seven ½-wave antenna. This length is about 9 feet too short for a two ½-wave antenna at 7.175 mc, but will be satisfactory for this frequency, because the antenna tuner will resonate the entire system—feed line and antenna—to the operating frequency.

Although this length would be usable on 21 mc, better results would be obtained by making it ½-waves long at this frequency, or 138 feet. It m be thought that there is little to choose between two lengths, because, while 126 feet is twelve too short for 21 mc, 138 feet is twelve feet too for 3.7 mc. However, twelve feet is over a ¼-v at 21 mc, but is less than ten per cent of ½-v at 3.7 mc. This indicates why it is usually bette make the length of a multi-band antenna correct the highest frequency to be used. The resul error will be less, percentage-wise, on the lo frequencies than it would be on the higher freq cies if the procedure were reversed.

Details are given in *Fig. 2*. If there is a ch center feed is to be preferred, because the e loading on each conductor in the feeder will re line radiation. Do not fret too much about it, H ever, if your layout makes end feed necessary. won't lose too much.

Antennas For Restricted Space

Three antennas, suitable for use where spac limited, are sketched in *Fig. 3*. Their operation bent or partially-folded ½-wave antennas on cer frequencies should require no explanation, but o ating *3C* in conjunction with a ground connec merits some explanation.

A grounded antenna exhibits many of the charac istics of an ungrounded one twice as long, and un proper conditions, it is an efficient radiator. conditions are that the ground connection m have very low resistance and that the lower part the antenna (which does most of the radiating) m be out in the clear. Neither are often met in practi therefore, an appreciable portion of the power into the antenna is wasted as heat in the gro connection, and the radiated fields are subject absorption and distortion by nearby trees, buildi and similar objects. In spite of these handicaps, s grounded antennas erected in poor locations radi surprisingly well.

Constructional data and the theory of opera of an efficient, grounded, vertical antenna, usa on 3.7 mc and 7 mc, is described in *QST* May, 1952. ("The Truth About The Vertical tenna," by B. W. Griffith, W5CSU.) Particu

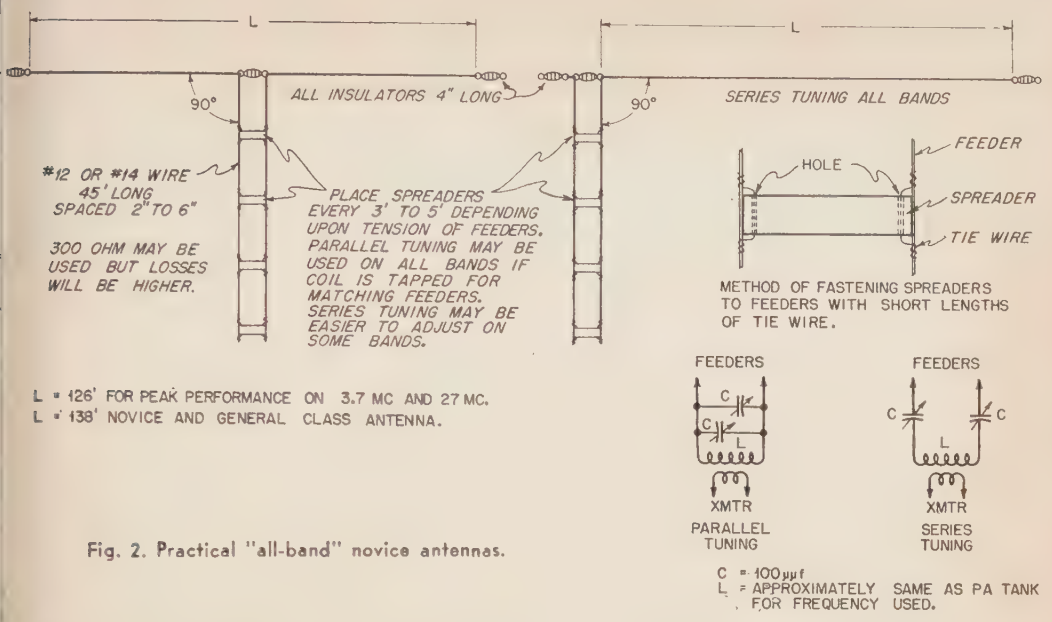


Fig. 2. Practical "all-band" novice antennas.

ttention is called to the effort required to obtain low-loss ground.

A Simple Rotary Beam For 146 Mc

Until the question of whether 21 mc or 27 mc going to be the Novice assignment is settled, there ems to be little point in describing beams for ither band. One of the 146-mc band, however, ould be desirable for any occupant of the band, nd the one to be described is simple enough to be uplicated by almost any Novice.

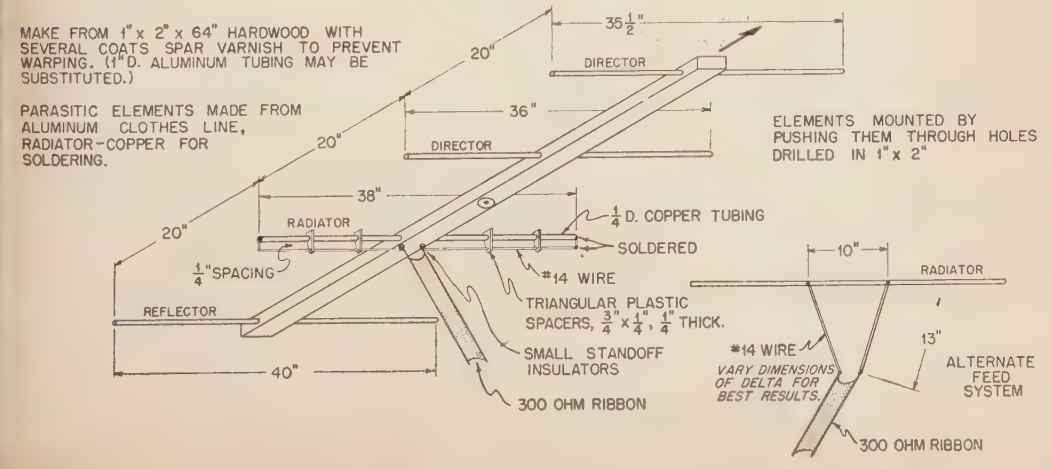
Most rotary beams consist of a ½-wave radiator nd one or more parasitic elements, spaced 1/10 to /3 of a wavelength from the radiator. Within these pacings, a parasitic element approximately five er cent shorter than a ½-wave is a director, and ne approximately five per cent longer is a reflector. he wider spacings make element lengths less critical nd give slightly higher gain, when more than two lements are used, compared to closer spacings.

A good, two-element beam will increase effective ower about two times, compared to a ½-wave oublet, and a four-element one will increase it up to five times. Gains of over 100 are possible with many elements in the proper configuration, but they are hardly Novice antennas. Four elements is a good compromise for a first 146-mc beam, because it gives excellent results, without excessive complications.

The dimensions in *Fig. 4* are for a frequency of 146 mc, making the beam usable over the entire Novice band. 300-ohm ribbon is used to feed the beam, because it is easier to make work reasonably well at this frequency than some other types. If it is exactly matched to the antenna, its length will have negligible effect on transmitter loading. You probably will not be that lucky; therefore trimming line length a few inches at a time may help in getting it to draw power from the transmitter. In any event, do not make the line any longer than necessary, as losses in it will decrease the effective gain of the beam.

Over normal VHF paths, receiving and transmitting antennas must use the same type of polarization for best results. Arguments over whether it should be horizontal or vertical resemble arguments over the relative beauty of blondes and red heads.

Fig. 4. The 2-meter novice antenna.



The figures cited are interesting, but prove little. The wisest thing to do is to use the polarization preferred in your area or to mount the array on a hinge; so that either may be used.

Miscellaneous

Gene, **WN4UVR**, writes, "I read Don's note about how long it takes to get a license, but he needn't worry. They told me the same thing (three to six months delay), but it only took a month and a day."

Spencer, **WN1NVN**, writes, "I received my license six weeks after taking the examination. I had made previous arrangements with Charles Wood, W2VMX, operator at W1AW, to operate that station when I got my license; so I went out there the same day. My first contract was with W1KOW on 146-mc phone. Then I contacted WN2HCZ on 3,706 kc. It was a little work cranking the normal kilowatt input used by W1AW down to fifteen watts. The rhombic antenna helped a **wee bit** in getting out, hi, hi.

"W2VMX said, to his knowledge, I was the first Novice ever to operate W1AW. It was a real thrill for me to make my first contacts from such a famous station. I sent WN2HCZ a W1AW QSL card with my name and call on it to confirm the contact.

"My own station consists of an SX28A receiver, 6-9 mc standby receiver, 35-watt transmitter, and a ¼-wave antenna."

(W1AW is the headquarters station of the ARRL.)

Jim, WN9OZN, and his station received a very fine write-up in **The Tipton (Ind.) Tribune**. Louis, **W9ESQ**, forwarded it to me, and Miss Kathleen O'Banion, Associate Editor of **The Tipton Daily Tribune**, who wrote the article, has granted permission to quote from it and use the photographs accompanying it. The photographs make it unnecessary to describe Jim's equipment, and the QSL cards prove he gets out. Antenna is end fed and 125 feet long, with one end tied in a tree. Power input averages thirty-five watts. Best DX has been 1,700 miles, and Jim's ambition is to work Rhode Island. With over 400 contacts in less than five months, its realization should not be too long delayed. Jim will then "die happy."

Ira, now **W2HMR**, suggests a box in each **Novice Shack**, containing the calls of Novices who have knocked the "N" out of their calls in the preceding month. I wonder if other readers would prefer such a special listing over the present method of making the news part of the item concerning the station. At any rate, George, **W2JGB** is ex-WN2JGB.

"As for code, I recognize this as part of their grade in my Electricity Class. In the laboratory, we have oscillators, a code machine, and three transmitters—75 watts on 4-mc phone, and two one-tubers on the 3.7-mc Novice band. Most of the studying was done at noon and after school. One stunt was for me to put W1AW's code-practice transmissions on a wire recorder, which I brought to school for the boys to copy."

Brother Louis, **W3RZZ**, writes, "At West Catholic High (Philadelphia, Pa.), we have a radio club. Five of the members, WN3PTA, WN3TPB, WN3TPC, WN3TPN, and WN3TPP, have obtained their Novice licenses. One, Frank Thornton, age 14, has earned his General-Class license. We will also send ten more boys down next week for their Novice and Technician licenses.

"Six of the boys have good receivers, because c hams have given them nice prices on their used recei and they want the old-timers to know that they appre this.

"I think the boys deserve a lot of credit, because come in for lessons at 8:00 AM, which is one hour be school starts. This means a lot, because half of them t to the city from the suburbs."

W1NOA is responsible for the following items. S WN1TUC, and Freq., WN1UHU, son of W1UJS, are m bers of the Stamford, Conn., AREC. Steve saw experi with the AREC in a recent surprise CD drill. Both w be eligible to operate one of the club's nineteen 14 mobiles if they were not too young to obtain a dri license, being Junior High School pupils. One of t teachers is W1PCZ. The Stamford Radio Club is p of their youngest members. . . . Paul, WN1USF, is retary of the Radio Club of Fairfield University, Fairf Conn.

WNØHFY reports a new Novice net. WØDYD WNØGHX are net controls. It meets a 3:00 PM Satu and Sunday and 5:00 PM Tuesday and Thursday. Novices around Minnesota are welcome to join. W to Bill Blass, WNØHFY, 3309 Abbott, N., Robbinsc Minn., for further information. . . . Ladd, **W9CYD**, rep that the Chicago Suburban Radio Association meets first Friday of each month at the Broadview Village F Broadview, Illinois. Novices and Technicians welc Contact Peter P. Forst, Jr., Secretary, 2016 South Ave., Maywood, Ill., for further information. . . . **WN8IJM**, is now W8IJM. He is fifteen years old, an the ninth grade. He worked forty-one states on the 3.7 band with sixty watts input and a ½-wave antenna fif feet high. Present transmitter ends up with a pai 807's completely shielded, with built-in low-pass fi and is TVI-proof, feeding an all-band, center-fed tenna, 136 feet long.

Two beginners who would like the assistance of som in their localities in obtaining Novice licenses are, P Stanck, 9355 S. Peoria St., Chicago 20, Ill., Teleph Hilltop 5-0314, and Gerald Bakke, 3801 Proctor St., F Michigan.

Questions From Novices

Q. Can you suggest a method of improving the ke of TBS-50 transmitters?—WN4VIV

A. Disconnect the end of RFC1, oscillator cathode choke, from the keying line and connect it to ch ground. This change will permit the oscillator to ru long as plate voltage is applied to the transmitter, w will improve keying, but will prevent working "break A SPDT toggle switch may be installed, to permit ch of either connection.

Q. How can I improve the selectivity of my 3-6 "Command" receiver?

A. Connect a 1-10 $\mu\mu$f trimmer condenser between grid and plate terminals (**pins 8 and 4**) of the first tube to introduce regeneration in the i.f. amplifier. just its value; so that the stage breaks into susta oscillation, indicated by a steady whistle from the ph with the BFO on, with the gain control near maxim Setting the gain control just below the oscillation p will increase selectivity considerably. Touch up i-f tu after adding capacity.

Keep the letters and pictures coming. See you month.—Herb.

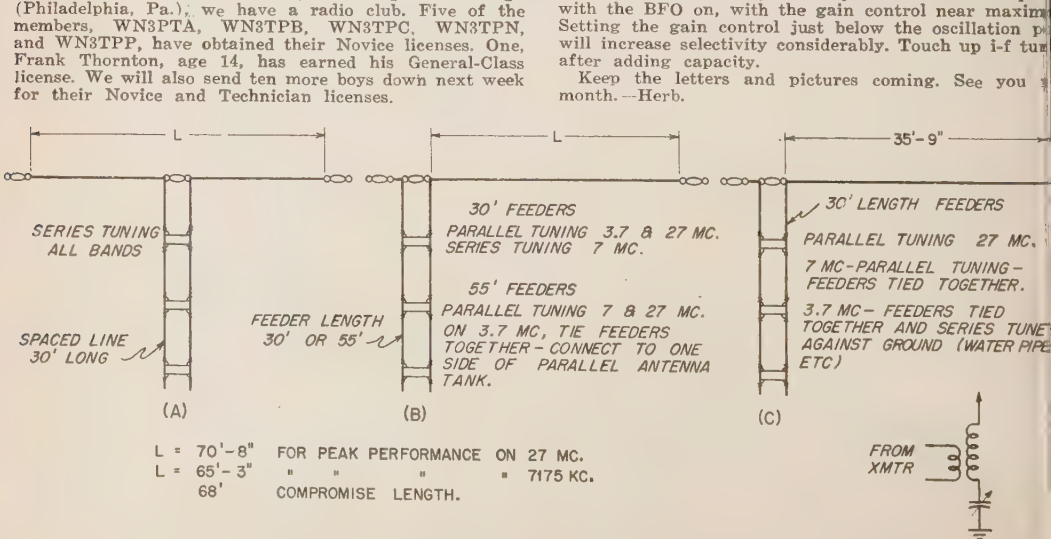


Fig. 3. All-band antennas for restricted space.



Gathered by DICK SPENCELEY, KV4AA*

The first week of 21 mc activity has given us a rough idea of the characteristics and capabilities of this new ham band. 21 mc seems particularly sensitive to propagation variations on a daily basis but promises to be one of our best DX bands when conditions begin their upward climb from the present bottom of the solar cycle. A similarity was noted between present conditions on 21 and those of 28 a couple of years back. Results depend entirely on openings which, to date, have been mostly of the north/south variety. East/west openings are predicted later in the year. Of course, there will be many times when 21 mc will be "normal" where anything can happen, and probably will. Perhaps a resume of actual activity during the first ten day period will tend to give a clearer picture.

May 1st:

At KV4AA a watch was maintained from 1200/2400z. First QSO came at 1523 with PY5XX. This was followed, later on, by contacts with TI2RC, KV4AI, YP1AJ and PY2CK. Not a single W was heard but the DX ends of the following QSO's were copied: CE3AX/W6MYC — W7HXG — W6TDZ — W6YRA — YN1AA, TI2RC/W6DFY and PY2CK/W6TZD. . . . At KT1OC, where Hank maintained a 24 hour vigil, no signals were heard until 1248z when contact was made with I1CUC. This was followed, until 1856z, by QSO's with EA4CN, HZ1MY, OZ5K, DL3SP, DL7AP, KT1UX, OZ7SN, PY2AQ and PY6AK. Heard were: YU1AG, 4X4FN, PY5XX, ZE3JJ and PY1AHL.

May 2nd:

This day the band did an abrupt flopover with openings between KV4 and everything from W1 and W6 to VE4 with signals averaging S8. Between 1645 and 0055z 90 contacts were made with KV4AA being a "first" for W1DF, W2AJP, W4IYI, W8NOH, K4AF, W2EUI, W8FVZ, W3JEW, W3AJP, W9NZZ, W4ANK, W4AEP, W2SCO and W5RMJ. At 0117/38z VK4HR, VK4SN and ZL1BY were contacted. It was heartening to see the number of stations that had hopped on the 21 mc bandwagon and to note that everyone from ten watts (W3UX) up were putting in fine signals with a variety of antennas ranging from long wires to 2 meter beams (plus feedline).

May 3rd:

Things slumped a bit but contacts were made with CE3AX, KH6YL, X8EE, WØCXY, W6FUF, W6GTI, W6DFY W6CYI and HP1BR.

May 4th:

Conditions were back on a May 2nd basis with 59 W contacts being made followed by a ZL1HY QSO at 0107z. From here on in to May 10th the band settled down a bit with fairly consistant W openings. Only DX of note was OQ5RA and OQ5BQ who both put good signals over the east coast area. KV4AA wound up this period with 224 contacts and 15 countries.

The PY area appeared to be in a better position for overseas contacts with PY4IE rounding out an early WAC with OD5AB, OA4AP, HB9FU, OQ5BR ZL1BL and W6DGJ. Milton also reports the following active hams: HP1AW, HC1RE, ZP4AB, MI3ZX, MI3SL, CX1IV, CX3IZ KH6ANZ, CX2AQ and



Needing no introduction to the DX fraternity are (in the usual order), F8BW, F8BS and F9LQ.

ZD9AA. . . . G3FXA reports 21 mc will be officially opened for G stations on July 1st. Don't forget to head your beams that way at that date. . . . From GM3CSM we hear that Ian has logged the following 21: PY, KP4, KV4, KG4, VE1, OQ5, TA2EFA and W1AXA, thus, the European path is not entirely out!!

From LU land we are sorry to hear that the Argentine hams do not expect to be granted use of 21 mc this year. . . . W5AVF reports ZK2AA and VR2CG heard on 21. . . . W1MB's initial post-war contacts on 21, 3.5 and 50 mc have all been with W1BB!!

At Time of Writing

EA9DC/IFNI—The long awaited EA8AW jaunt to Ifni and Rio de Oro materialized on May 11th at 2000 when Crescencio came on the air. This has

A monthly department. Address all correspondence to R. C. Spenceley, Box 403, St. Thomas, Virgin Islands. U.S. Air Mail rates apply.

precipitated one of the most gosh awful struggles of kilowatts that we have seen in some time. After spending some time handing out phone QSO's on 14310, EA9DC, who is fundamentally a phone man, must be given a big vote of thanks for allotting generous portions of his time to CW operation. Fortunately conditions took one of their rare turns for the better on 14065 during the 2200/0300 GMT period and QSO's were noted with the following lucky ones: W8HGW, W4CEN, W6VFR, W8ELL, W3CRA, W6DGJ, W3EPV, W9KFC, W9FID, WØYXO, W3BXE, W3CTJ, W6WQ, W6DFY, W6PFD, W6AM, W6SC, W3EVW, W7AH, W2AGW and W2CTO, to mention a few. Cards should be sent to EA8AW, Box 346, Las Palmas, Canary Islands, and, according to XE1AC, a dollar should be enclosed for those wishing an air-mail reply. Crescencios' next camel stop is Rio de Oro. See QTH's.

Endorsements to Honor Roll appearing in June issue:

W1FH	40-248	W8SYC	39-207
W3BES	40-243	W8WWU	39-157
W6ENV	40-241	W5KUJ	38-177
W6AM	40-235	WØTKX	38-174
W3EVW	40-232	OH3OE	37-112
W7BD	40-214	W5FXN	35-146
W6TI	40-207	ZL3CP	35-117
DL7AA	40-204	**PHONE ONLY**	
WØELA	40-201	XE1AC	39-215
W5ASG	39-229	W6AM	38-163
XE1AC	39-223	W1NWO	36-192

Next complete Honor Roll appears in the September issue.

ZC2MAC/COCOS, VS7MC/G3CRY, ex VP9K, is another one who has been giving the gang one of those hard to get places. Mac is usually on the lower treqs of 20 around 1330/1530 GMT. and will be active until mid-August. No QSLs will be forthcoming until he returns to Ceylon and we understand cards should go via RSGB. Mac runs 40/50 watts to a long wire and the recvr is AR88. QSO's to date have been noted with the following: W6ENV, W6VFR, T12TG, W6AMA, W6PFD, W7BD, W6PFD, KZ5WZ, W6KYG, W6DLY, W6FSJ, W6AM, W5ADZ and W5ENE. Operational schedules may be obtained by QSO with VS7NG.

HZ1MY/SAUDI ARABIA, W6MLY/KL7JDG/XE3-MY/W4DVL/WØMLY, came on the air April 19th and in six days racked up 362 contacts in 85 countries and 32 zones with his 32V2/75A2 setup on all bands. This is a station to watch as, during his two year stay, Dick plans operation from the following 'hot spots': YA, FL8, YI, CR8, VQ6, Yemen (4W1) and the kingdom of Qutar. QRO to 500 watts is planned for the near future. All QSLs should go forward via air-mail and envelope. See QTH column.

Another station should be active at ZC2 (Cocos) about June 1st, according to info received from W7BD through a VS1CZ QSO. Ken, VS1CZ, advises that this gent will arrive at Cocos on May 25th and will be active on both CW and phone. VS1CZ will take care of his QSLs and will maintain skeds on 14062. . . . From Wally, W1HE, we are advised the BAF Scott Glacier Expedition, Bay of Whales, Antarctica, will be on 14 CW after July 20th. . . . FP8AI and FP8AJ, St. Pierre & Miquelon, will be active this summer in the persons of VE3BJD and VE3CCK respectively. . . . W5AVF reports VK9GM, Norfolk Island (Separate country), is active daily on 7011 from 0600 to 0800z. . . . From G3IDC we hear that Geoff, SU1OG, is now putting in some time as JY1OG, Jordan, 14070. . . . TI2TG advises that VR1F should be on at VR4DF now. After a few months VR4DF will appear in VR6, Pitcairn, and then go on to VR7. . . . I1AIV states there will be legitimate ham activity in Vatican City, HV, within a very few days (May 19). Let's hope that this is now a fact.

Here are a few items via G6QB, Short Wave Mag: The former AP2Z is now home. If any QSLs went astray drop him a line. See QTHS. . . . Geoff, ex VU2GH/AP4A, has taken over the AP2Z rig and will be active in Karachi. . . . VP8AJ is ex G3AXN, he runs 350 watts CW and 250 phone. . . . ZC4RR is a new one in Cyprus. . . . VS1EV confirms his intentions to operate from VS4 when license is received and goes on to say that VU5AB, Nicobars, is genuine and QSL's but he is on 7 mc CW only and at infrequent intervals. . . There are 18 active stations in VS1 at present.

Here and There

From **VK4QL** we hear that VK2QZ, who has been operating /VK9 should show up in VR4 land very shortly. . . . **W1ABA** is on again, with Viking, after a layoff since spark days. . . . **VE1DG** in now VE3CNC. . . . **W4CG/KV4** is now KV4BB, see QTHS. . . . **4X4CJ** assists F7AS and F7BB in army communications work W8PQQ . . . SM5AXC and three SM aircraft men visited W6AM. Don should now be back from his European jaunt. . . .

VK/ZL CONTEST 1952

WHEN: 1200 GMT Sat. Oct. 4th to 1200 GMT Sun. Oct. 5th for CW. 1200 GMT Sat. Oct. 11th to 1200 GMT Sun. Oct. 12th for Phone.

SCORING: One point for each contact with any VK/ZL disrtict on a specific band. Final score: Contact points multiplied by VK/ZL districts worked on all bands.

SERIAL NRS: Six numeral (Five for phone) RST plus 001 for first contact, on up.

LOGS: Separate sheet for each band, should reach NZART, Box 489, Wellington, N. Z. on or before Jan. 23rd, 1953. Mark envelope "VK/ZL Test."

LISTENERS SECTION: (For SWL's) — Logs must show station calling and called, RST and serial number sent by calling station. Same scoring applies.

DL7AB advises that GM3HGA, Shetland Islands, is a substitute for the un-QSO-able UA1 on Franz Josef Land. This is for the WAE certificate. . . . Rudi, **DL7AB**, suggests substitute stations, such as have been established for WAE, be made for WAZ so that UA may be bypassed. H-m-m-m. . . . **W3ENK/KG6** advises that W3ENK went off the air on Jan. 31st. Since April 10th Chas. has been active in Guam. 95% activity is planned on 14 CW. See QTHs. . . . From **ZL2LB** we hear that VR5GA is now ZL1AJL. . . . Larry, **W9IOP**, (W2IOP and W8IOP) has received his 75 ft. tower and should be going strong by the time this is read. . . . **W3LE** bemoans his poor QSL average, 165 for 206, and seeks pasteboards from CR4AC, VQ4HU, FB8BB, CR6AN, ZD9AA, ZD6AC, VS2AA, VS9AO, VU7AH, FO8AC, VS9MA, VR1D, VR2BJ, KM6-AV, VK9YT, AC3PT, VQ8CB, VR5GA, MT2E, MD2PJ, XZ2KN and VR1C. You have lots of company in this situation Lou and I guess the only solution is to locate them and wear them out via mail. . . . **W6AM** advises that MOLUCCA is a new republic. Their stamps appeared in USA in April. The question arises, is this one separate from Celebes and do present FCC restrictions hold as applied to Indonesia? A subsequent QSO with W1RWS

tells us that the FCC would have to pass on this one. . . . After two hours of aerial gymnastics **W6KIP** located a busted bolt on his beam dipole. . . . **W3EVW** shattered his elbow as a result of a fall while repairing beam. Roger is doing nicely now and advises he received his CR5UP card by writing to W4PJU and enclosing stamped envelope. . . . **W2ESO** believes we should give a big hand to those DX spots who immediately QSL, such as IS1AHK and EA9AP, we concur. . . . **PK4DA** gave a very interesting talk to 46 DXers recently at a No. Calif. DX club meeting. Arie has worked 40 zones on phone, but, that's right, all confirmations not yet in. . . . **W6AM** advises that with the J peace treaty Japanese nationals can, no doubt, be legitimately worked and should be given all encouragement. . . . **KV4BB** visited KV4AA. As a result AA now has a pair of 4-125A's and other QRO gear. Hold your hats boys!! . . . **W2AGW** chatted with W6QD and W6LS on recent West Coast trip. . . . In a meeting of the West Gulf DX Club at Shreveport, La., April 26th, the following officers were elected: Pres. Bob Wagner, W5KUC. V. Pres: Al Wingate, W5CEW. Secy: Marion Wagner, W5UCQ. Treas: Jim Price, W5FXN. The policy committee consists of W5KUC, W5CEW, W5ASG, W5EGK, W5ENE, W5KC and W5MIS. . . . Ned, **FM7WE** (FM8AD) returns to FM in August or September according to a QSO with Ned at F9QU.

WAIP AWARD (Worked all Italian Provinces)

This certificate is sponsored by "Radio Club Amatori" Box 172, Ravenna, Italy. Applicants must show confirmation of contacts with sixty of the existing ninety three Italian Provinces under the prefixes of I1, IS1, IT1, MF2 or AG2. Contacts must be made after Jan. 2, 1949.

Deeds and Doings

W8YIN nabbed YU1CX, VK6LU, EA8BF, TF3MB, ZE3JP, VK9XK and GC 4LI 7 & 14 mc. . . . **W8SYC** QSO'd ZP1TB and LZ1KAB (ops LZ1DP, LZ1MN and LZ2PI on hand) while adding QSLs from ZM6AK, ZS2MI, VQ1RF, YI3BZL and VP8AP. Clint is now 207 . . . **W3IL** added OQ5RA. . . . **YV5AE** rises with KC6QY, KX6AS and KW6AW. . . . **W5ASG** goes to 229 with KC6DX (eastern Carolines) and the split package VS1/2 deal. . . . **W5AVF** hooked TG9AQ who promises to be more active. . . . **ZK1BC** and **KV4AA** hooked KS6AA together, thanks to KH6WU. KS6AA leaves on June 20th according to W6TXL. . . **W1FH** is adding everything that comes along such as EA9DC etc. his present total is hazy now as our adding machine blew up. . . . **W5FXN** reaches 146 with VP8AJ, EL7A, EAØAB and VQ1RF while **KG4AF** nabbed ZC1CCT and HB1HY/HE. . . . **W4EXO** ponders QSO with one PX2AE who says QSL via ARRL. . . . **KV4AU** adds FKS8BC and 5A2TS. . . . A card from **ZD9AA** made it an even 200 for SM5LL. Nice going Hilding. . . . **DL7AA** goes to 206 with such as YA3UU FL8BC CM6AH and VK1WO while XE1AC goes to 215, phone only, with VS2AL. . . . **OH3OE** reaches a modest 112 with VQ3BM, KW6BB, FN8AD, MI3LK and EA9AP while **W1NWO** hits 192. A3 only, with EA9DC, CR4AF and ZK2AA. . . . **ZL3CP** adds a new zone, VK1PN, and CR9AF, YN1AA and KH6QY/-KC6, atta boy Chas. . . . Two 'firsts' on 160 are W2QHH/-VP4LZ and G2YY/ZC4 QSO's. . . . **W5KUJ** reaches 177 with VS2CP and FD8AB. Chas. also welcomes cards from ZD6DU YI3BZL ST2GL and EAØAB. . . . **W6COH** warmed up the five watter and brought in VK3GA, ZS5LA, LU1QB and TI2CR. . . . **W8WWU** adds EZ4BB/9S4 and VS1CW for 157. . . . Bob, **WØTKX** accents his steady rise with EA9DRC VK2QZ/9 HE9LAA ZC4DT LZ1KAB ZD9AA and others. . . **W4KE** submits a recent all-band list which includes VP7NM, KH6PM ZL1HM on eighty, YO2BC, FA8BG, EA1AB, EA8BF, YV5DE on forty and GC4LI, AG2AG, OA5A, ZE3JP, KT1OC on twenty. Eleven accounted for KH6ABF while ten yielded LU3EL and KH6IJ. . . . **W4TRP** came thru with 9S4AX, 5A2TO, HB9NL, OZ8BB and F7AT giving Bob 57 for 7 months hamming. . . . **F8BS** adds PY1YR VK9XK. Pierre advised patience and all will receive their FB8ZZ pasteboards.. . . **W6TI** adds a VS1/2 and ZM2MAC which brings Horace to 207. . . . For **W8ZBD** we say that TA2EFA is quite OK. The volumn of QSLing he has to do probably slows him up Chas. . . . **W9FID** makes it 198 confirmed with crds from VQ1RF VP8AU and VP2GH . . . **W2CTO** recd crd from ZP2AC thereby finally rounding out So. America.

Isreali Award (c/o 4X4BX)

This award is issued to stations who have contacted 16 different 4X4 stations on the following bands: 3.5, 7, 14 or 28 mc. (21 mc?) At least one 4X4 must be worked on each band mentioned.

On QSL's

W1NWO, who handles cards for 9S4AX, wishes it to be known that 9S4AX will not send QSLs to W's before receipt of their cards. If cards are sent via W1NWO they will be acknowledged promptly. . . . Through a misunderstanding we mentioned **WØYXO** in connection with ZK2AA QSL's. We quote a reply from Ken: "I do not now nor have I at any time in the past had ZK2AA's log nor any arrangement with him to act as an receiving station for cards addressed to ZK2AA. The notice which appeared a year or so ago to 'QSL via WØYXO' was not authorized by either ZK2AA or WØYXO." We hope this will set things straight. . . . **W5AVF** advises that ZM6AK (ZL1FT) has received a supply of cards via W6JZP and by this time most of you should be in possession of the long awaited ZM6 pasteboards. Norm writes that the ZM6 administration froze all stationery due to paper shortage (raw-ther embarrassing at times—wot!!) and, while regretting the unavoidable delay, feels that the ZM6 QSO's were the important thing and QSL'ing could be always taken care of later. . . . In response to our query the following stations have advised that they would be happy to handle QSL's for stations on DX spots who find it difficult, for one reason or another, to acknowledge their contacts via QSL card. We urge such stations to get in touch with one of the following: **W4AZK, W3LE, W9NN, W4TRP** or **W5WI**. . . . **W4RBQ** has recd a QSL from JAØIJ (Iwo) who is now stateside. See QTH's.



Snapped by SM5ANY at the SSA QSL Bureau we see the origin of such husky signals as (l. to r.), SM5ARL, SM5AFU, SM5AQW, SM5AQV and SM5AOI.

QTH COLUMN

EA9DC (Ifni/Rio de Oro) EA8AW, Box 346, Las Palmas, Canary Islands.
CR4AI Jose, Sal Island, Cape Verde.
ZC2MAC (G3CRY VS7MC) Via RSGB.
JAØIJ W4QCA, R.W.Cook, 146/1 Prichard, Ft. Knox, Ky.
ZC1CCT Via RSGB.
EA9BF and EA9BD Box 38, Tetuan, Sp. Morrocco.

(Continued on page 62)

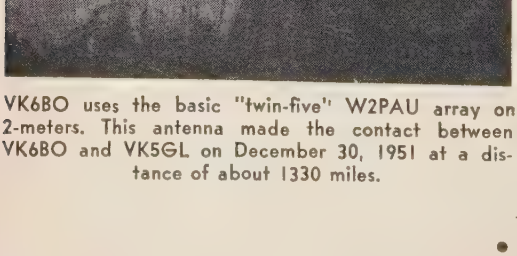
the VHF news

Edited by
W. E. "BILL" McNATT, W9NFK*

Two Meter Auroral Propagation, April 29—May 3

W2NLY, South Plainfield, New Jersey, worked W9UCH, Fort Wayne, Indiana; W8BAN, Jackson, Michigan; and W2ORI, Lockport, New York, on the April 29th auroral opening. W2UHI, W9EHX (McLean, Illinois, over *800* miles), W2YXE, W2SPU, W2OPQ, W2SFK, W1BCN and W1IZY were heard by Jim. W8ZUR/8, Springfield, Ohio, heard W2SFK and W2NLY at about 9:30 p.m., EST.

On April 30, W2AZL, Plainfield, New Jersey, W2OPQ; Hagaman, New York, and W2PV, East Greenbush, New York, all worked W9UCH.



VK6BO uses the basic "twin-five" W2PAU array on 2-meters. This antenna made the contact between VK6BO and VK5GL on December 30, 1951 at a distance of about 1330 miles.

W8ZUR/8, Springfield, Ohio, on May 1st, worke W1IZY, Middleboro, Massachusetts, and W8FR Jonesville, Michigan. Ed also heard W2ORI; W3RU Pittsburgh, Pennsylvania, and W2OPQ. This activi was between 9:00 and 10:30 p.m., EST.

On May 2, Jim Kmosko, W2NLY, heard W1IZ W9UCH and W9SUV, but his calls were in vai Aurora prevailed again on May 3. W2NLY worke W9EHX; W8RMH, Detroit, Michigan; W8BG St. Clair Shores, Michigan; W4AO, Falls Churc Virginia; and W3LWN, Sigel, Pennsylvania. W9UC was heard, S8 on peaks; also, W9FB?, W2OR W3KWL, W3RUE, W1IZY, W2SFK, W8DX, W8GA W2OPQ, W2YXE, W2AZL and W2UK.

W2NLY comments, "W9EHX was S5 a good pa of the entire opening from 5:45 to 8:00 p.m., EDS If only more W9s and WØs had been on, I'm sur they might have had east coast contacts. . . . Auror signals seem stronger during daylight hours, or dusk. So, getting on the band at an early hour—an taking the XYL out, later—might pay off!"

Six Meters

Coincident with the 2-meter auroral opening, the meter band also came to life. **W6BWG**, San Gabrie California, reports that one-hop skip occurred betwee southern California and Texas on April 29. At abou 1400 PDST, Wes heard W6QUK, San Bernardino, workin W5SFW, Amarillo, Texas. Phil's signals were Q5, S plus about 10 db. W6BWG promptly fired up and raise W5MJD, Amarillo, at 1410 PDST; Joe's signals wer about the same as W5SFW, with some QSB noted, unt about 10 minutes later when the band folded. No othe signals, local or otherwise, were heard.

W7HEA, Toppenish, Washington, reports, "The firs six-meter opening of the year came (here) on April 3 at about 0730 to 0815, with no one on at the other end so no contacts were made. Harmonics of commercial around San Francisco bay were in up to 50.8 mc, and th commercials below 50 mc were S9 plus. I couldn't rais a thing on 6, though!

"On May 3, at 2011, W7FGG, Tucson, Arizona, brok through for the first contact of the year. Jerry's signa was over S9 at times. He faded out, and at 2050 W6ABN started coming through, followed soon afterward b W6OB. Signals were not as good as W7FGG, peaking at about an S7. The band folded at 2109. On May 11 about 2000, the f.s.k. RTTY on about 49.9 mc from Alaska was heard for the first time this season; sure wish someon was on, up there."

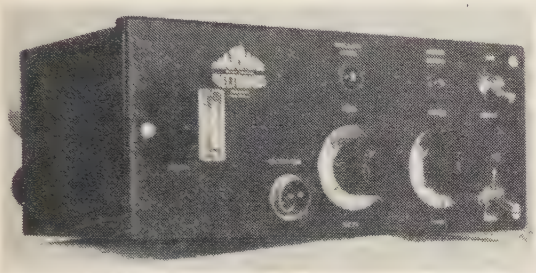
W4MS, Pensacola, Florida, informs us that active 6-meter stations there are W4FHQ, W4UCY, W4PQW W9CGO/4, and W4MS. Eddie's QSOs for May were W5LFH, May 4th; on the 8th, W2ZUW and W5LIU W9EWO and W9MHP on the 11th; W1HDQ on May 13 On the 14th, W8CMS, W3RUE and WØTJF, who was worked for one hour because no other signals were heard between 2218 and 2318 CST! W5LIU was worked again on the 15th: W5SFW and W5LFH on the 16th; W9FJB Winnetka, Illinois, on the 17th. May 18th paid off very

**Address all letters and correspondence to 2515 LaBranch, Houston, Texas.*

NOW AVAILABLE

ROTHMAN MODULATION

BROADCAST QUALITY — NO OVER-MODULATION
HIGH EFFICIENCY — LESS EQUIPMENT



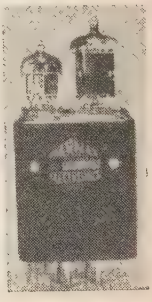
MARMAX 50 WATT MOBILE TRANSMITTER

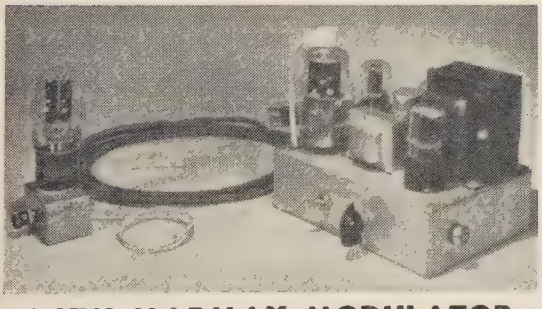
Model MT-52 **Net $79.50**
With One Set of Plug-In Coils

- 50 Watt Peak Power.
- 400-600 V.D.C. @ 100-150 M.A. Input.
- Controlled Carrier.
- Low Battery Drain.
- All Band Operation 6 through 75 Meters.
- Extremely Compact.
- Dash Mounting.

The heart of the MARMAX MOBILE is the MARMAX MOBILE PLUG-IN MODULATOR MO-52. Also obtainable separately for your present Mobile Transmitter.

MARMAX MOBILE MODULATOR
Model MO-52 **Net $12.50**





1 KW MARMAX MODULATOR
Model KW-52 **Net $54.00**

High Fidelity Modulation for powers from 50 watts to 1 KW with built-in speech amplifier for high impedance microphones.

IMMEDIATELY AVAILABLE
If your favorite dealer cannot supply, write direct to factory.

All Units Complete With Tubes—Wired, Tested & Guaranteed

MARMAX ELECTRONICS

716 NEW YORK AVENUE • ALAMOGORDO, NEW MEXICO

nicely with contacts to W8CMS, VE3AET, Lansing, VE3AZV, Oshawa, VE3ATE, Toronto, and VE3DKW, Hampton, Ontario. On May 13, when W1HDQ was worked, W4MS also heard the VE9 beacon; on the 14th, Eddie heard WWV transmitting "N" on 30 mc when he worked W8CMS and W3RUE. W4MS VHF DX Scoreboard total is 40 states, 5 countries.

W8BLN, North Hampton, Ohio, is now on 6 meters, according to W8WRN, Columbus, who has been making tests with him. He uses a 6J6-832A transmitter and a 4-element beam. W8CPA plans to have a 6-meter mobile rig in service by now. He travels a great part of the time and works on the rig on the overnight stays.

Australian Two-Meter News

Letter from VK6BO

"As one of the operators in the VK5GL—VK-6BO mc QSO mentioned in your 'VHF News' March, 1952, may I thank you for recording the contact?

"I would like to pay due tribute, however, to W2PAU because the beam here was based on his 'Twin Fives.' Element diameters were different, etc., but it was his article in *CQ* that was responsible for the spacing.

"The top set of elements is 53 feet above ground. (See photo.) The twin fives are above a 50 mc 4-over-4 array. The 144 mc array is fed through 120 feet of 300-ohm flat ribbon with a shorted matching stub. The two arrays are independent.

"You will probably be interested to know that on February 9th I again contacted VK5GL and also VK5QR. VK5QR and I had tried over twelve months before to break through, so I was very pleased to contact him. The band was open for well over half an hour, to my knowledge.

"To work through to Adelaide, I have to shoot over a 1000 ft. range (of mountains) 5 or 6 miles away.

"The distance of the contact between VK2AH and ZL3AR, on 144 mc, is within a mile or two of the VK5GL—VK6BO distance.

"As a matter of interest, the transmitter here is EL32 oscillator, EL32 tripler, 6AQ5 doubler, 832 trippler to 815 p.a. running 45 watts input. The receiver is a 6J6 p.p. neutralized triode r.f. stage, RL7-RL7 cascode r.f. CV6 triode mixer, CV6 oscillator (132.5—136.5 mc), 6SH7 i.f. at 11.5 mc, 6J8 mixer to 455 kc, 6G8G i.f. and a.v.c., 6H6 detector—noise limiter, 6SN7 cascade a.f. to 5" speaker; 6J5 b.f.o.

"I am looking forward to the next DX season on both 50 mc and 144 mc, and hope to make a few extra contacts on 144 mc.

"I trust that you will be kind enough to pass on my thanks and my appreciation to W2PAU, and I am enclosing a photo of the array so that he . . . and you can see what it looks like, on top of the 4-over-4 array on 50 mc.—73, Rolo, VK6BO."

(*VHF Ed.* Note: Thanks, Rolo, for a very nice letter. We all appreciate it, and hope that you can find time to keep us up to date on v.h.f. activity in your country!)

220 Mc—420 Mc Activity Increases

On April 19, the first Hamilton—Toronto contact on 420 mc occurred when VE3AQG, Hamilton, worked VE3AIB, Toronto, crossband to 2-meters, according to VE3DER. Iris says that Sid, VE3AQG, unfortunately didn't have his 420 mc. receiver working. It is expected that the 6J6 converter will be working soon, however. Hi!

Since the initial QSO with VE3AQG, several Hamilton contacts have been made. VE3DAN worked VE3DAL/3, Hamilton, but—thus far—VE3DAL, at his home location, hasn't been able to get through from below the Hamilton "mountain." VE3AXT, VE3BQN, Toronto, W2ORI, Lockport, and W2PSG, Lewiston, New York, have also been active on 420 mc, VE3DER concludes. Please send your reports of activity to Mrs. Iris F. Weir, 209 Yarmouth Road, Toronto, 4, Ontario. Although the Weirs are moving and no report is expected, again, until August, that address will be satisfactory until the new one is announced.

W2QED, Seabrook, New Jersey, became a proud father for the second time when his second daughter arrived on April 25th at 5 a.m. with a net weight of seven pounds! "That's the main reason that 420 mc activity at W2QED was so low," says Ken.

During the time available for activity, however, W2QED reports that conditions generally were much better than they had been for several months. "As you can see by my contacts with W3BSV, the only schedule kept regularly, the signal strength over the eighty mile path remained high through the entire month. It probably dropped to winter-time average during the final week, as we had seven straight days of rain—but, those included the nights I spent with the XYL at the hospital, so I have no data except for the contact with W2BLV on the 26th when conditions were poor, even at 25 miles.

According to W2QED, news from other 420 mc stations indicates that much improvement of equipment is being made, probably because of the expectation of summertime DX. "Some serious attempts to break the 420 mc record will be made, I imagine," says Ken.

W2EH, Collingswood, New Jersey, now has a new 40-element bem. W3RKQ will have a new crystal-controlled transmitter on 420 mc, using an AX-9903 in the tripler and the final. His former rig, an AX-9903 tripler-final will be used by W2HEK who is polishing off a new converter using 6J4 r.f. stages andd a 1N21B crystal mixer with a 955 oscillator. The output stage is on 2 meters so that the 2-meter receiver can be used as an i.f.—audio system. W3OWW finally showed up on 2 meters again with an entirely new rig; he says he is rebuilding the 420 mc gear, according to W2QED.



How about this rare one for the wall?

W5FEK, Houston, Texas, says that 220 mc activity is getting more play, all the time. . . . **W5ONS**, Victoria, Texas, heard W5AJG, Dallas, for the first time on the morning of May 9th. LeRoy was putting in an R5, S7 signal over the 275 mile path, but had no way to modulate it. . . . **W5FSC**, Houston, has his beams for 50, 144 and 220 mc now up to 70 feet and worked 220 mc duplex into Austin with W5BDT and W5AXY on the morning of May 15. Bud has a measured gain, against a reference standard, of 2 and one-half S-units, on the array at 70 feet as against the old set-up at 30 feet. . . . **W5ONS** is building 420 mc gear and W5BDT and W5AXY in Austin are already operating across town. . . . **W5ON**, Houston, **W5UB**, San Antonio, and **W5IVU**, Edna, are planning equipment.

W8WRN, Columbus, Ohio, reports that it looks like 220 mc is really coming into its own in his area. W8WRN now has a 12-element beam about 40 feet in the air. The AX-9903 final is now operating with about 50 watts input; the converter has been improved. . . . Jerry, **W8WJC**, is completing the new super-duper 220 mc antenna, and has the p.p. 4-65As operating at 300 watts input. On May 4, according to W8WJC, a roundtable of 5 stations on 200 mc was active in the Cleveland area, including W8WM. . . . **Flash**—W8UKS is back on v.h.f.! Yep, Sam is on 220 mc with a pair of 826s, according to W8WRN. He's expected to be back on 2 meters, also; took down the "d.c." antennas in early May. So, look out, cautions W8WRN, "That boy really gives all he's got to the band of his choice, that's for sure!" **(Ed. Note:** About 4 or 5 years ago, "Ukus"—W8UKS—was a fervent, active 2-meter man whose immense devotion to the band made him known all over the country. Sam's return to v.h.f. is indeed encouraging.)

W8DQR, Toledo, W8DX, Detroit, and W8CPA, Columbus, are all expected on 220 mc soon. As for 420 mc, W8WRN says that he still has to get a good receiver going; W8CPA is also working on equipment. W8UYL/8 promises to bring his 420 mc gear from his Canton home.

HARVEY HAS THE MOST COMPLETE STOCK OF MOBILE GEAR

SONAR MOBILE Rcvr. Model MR-3

Complete coverage for 10-11-20-75 meters. 8 tubes, 4.5 watts audio output. Uses: 12AT7 RF stage and B.F.O.

12AT7 oscillator mixer
(2) 6CB6 I.F. stages
6AL5 2nd detector and noise limiter
6AT6 1st audio
6AQ5 audio output
OB2 voltage regulator

1 Microvolt signal produces 0.5 Watt audio output. A.N.L. and B.F.O. are push-button operated.



Requires 250 Volts at 60 to 80 mils. Size: 4-9/16" x 5-3/16" x 5-11/16". Complete with tubes . . . less power supply and speaker.....**$89.95**

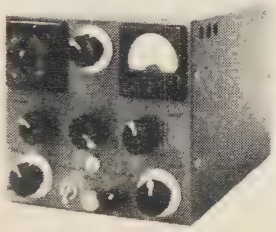
Model SR-9 Receiver. A 9-tube superhet with built-in automatic noise limiter, voltage-regulated oscillator, and slide-rule dial. Sensitivity better than .5 microvolt. Size: 4-9/16" x 5-3/16" x 5-11/16". **$72.45**

Model MB-26 Transmitter. 6-watt output . . . 6 standard tubes. Built-in antenna relay with connectors for power and antenna. Size: 6½" x 7" x 5⅞". **$72.45**

AC Power Supply for SR-9 and MB-26 **$30.00**

Note: Receiver and transmitter are available in a choice of 2, 6, 10 meters, and commercial frequencies, AM and FM, as well as 108-132 mc for aircraft.

JOHNSON VIKING Mobile Transmitter Kit



A low cost, efficient and extremely flexible rig, in kit form, ready for quick and easy assembly.

AMPLIFIER INPUT: Up to 60 watts 100% modulated. 30 watts input at 300 volts.

RF SECTION: Three full stages, 807 output amplifier.

AUDIO SECTION: 6BH6 speech amplifier, 6BH6 driver, and push-pull 807 modulator.

FREQUENCY RANGE: 75, 20, and 10 meters with provision for one additional band.

FREQUENCY CONTROL: Crystal . . . VFO input and power receptacle provided.

Other Features Include: Bandswitching, gang-tuning, crystal selector assembly, RF fixed bias supply, all stages metered.

Net Price .....Approximately **$75.00**

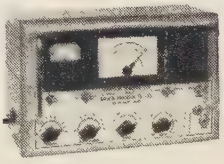
Available Soon!

Order Now for Early Delivery.

A HARVEY SPECIAL

#7 Stranded Wire

Heavy Duty Rubber Covered — Tinned. Ideal for Hooking Up Mobile Supplies. 50-foot lengths.....each **$4.95**

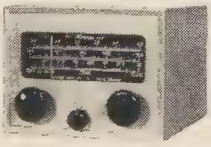


ELMAC-A54 Under-dash Mobile Xmtr.

Measures: 7½" x 7½" x 12"
Weighs: 14½ lbs.

For Carbon Mike Input.....Net **$139.00**
For Dynamic or Crystal Mike, Net **149.00**
Power Supply, 110 volts AC, Net **39.50**

MORROW CONVERTORS



The latest in Mobile Converters . . . Easy to operate . . . Sturdy construction for long, trouble-free service.

Model 2BR for 10-75 meters, net **$54.95**
Model 2BRLN for 10-75 meters, net **$49.95**
Model 3BR for 10-20-75 meters, net **$64.95**
Model 3BRLN for 10-20-75 meters, net **$59.95**

The LN series converters are identical to the standard 2BR and 3BR converters, less the noise limiters.

POLICE ALARM Mobile FM Receivers

High quality, emergency band FM receivers for all applications. Brings in police calls, fire alarms, bus dispatchers, rail communications, etc.

Model M-101 (152 mc to 162 mc) 6 volt mobile.....**$72.50**
Model M-51 (30 mc to 50 mc) 6 volt mobile.....**$72.50**
Model AR-2 (108 mc to 132 mc) 115 V. AC or DC.....**$49.50**

FIRST IN THE EAST
THE NEW
BAY MOBILE ANTENNA



West Coast amateurs report terrific success with this 75 meter mobile antenna. Utilizing a new method of center-loading, it has outperformed others in on-the-air comparison tests.

Overall length is 9' 3", trimmed, maximum diameter 1⅛", and it is fully weather-protected by a fibreglass seal over its entire chromed brass surface.....**$19.95**

COMPLETE HANDSET SPECIAL



Has a single-button high-output carbon-mike and sensitive earphone with push-to-talk switch, 3-foot, 4-conductor rubber covered cable.

Complete with mounting.

A Real BUY.....$12.95

SUPERIOR POWERSTATS



Smooth, efficient voltage control, 0-135 volts output from 115 volt AC line. Models also for 230 volt input. Write for free literature. Models for table and panel mounting.

Type 20, 3 amp.....**$12.50**
116, 7.5 amps, table mtg..... **23.00**
116U, 7.5 amps, panel mtg... **18.00**
1126, 15 amps..... **46.00**
1156, 45 amps.....**118.00**

. . . and the New:
Type 10, 1.25 amps. (150/165 VA) **$8.50**

IN STOCK FOR IMMEDIATE DELIVERY

RAYTHEON Transistors

Type CK716.....**$18.00**

VISIT THE AUDIO-TORIUM. Come in and visit our new sound department . . . all these items and many more on working display at all times.

Telephone hrc LUxemberg 2-1500

HARVEY RADIO COMPANY, INC.

103 West 43rd St., New York 18, N. Y.

NOTE: In view of the rapidly changing market conditions, all prices shown are subject to change without notice and are Net, F.O.B., New York City.

W9TQ's Badger Milk Run

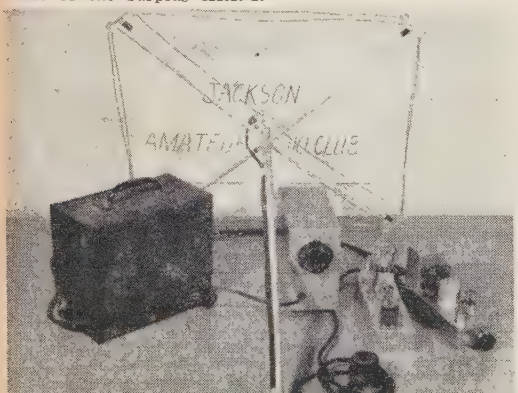
Conditions and activity on two meters have both improved in the Milwaukee, Wisconsin, area. The increase seemed to start during the second week of April. More Novices are on and are busy with two meters. Each and every one of them are most welcome and are heartily greeted by the "regulars."

WN9OOW is now using an 829B final and a new modulator as a result of some rebuilding; he is also working on a new converter. . . . **WN9RNI** finally got on, and is improving the power supply; he hears more than he works. . . . **WN9RNJ** is selling some equipment, but is keeping enough for his new QTH in Florida. . . . **WN9RXI** has a final signal. . . . **WN9QME** has been heard; nothing from WN9RTU and WN9RYV, so far. From Illinois, we have **WN9OKF** (Leo, "You Can't Stop Me," Heuer) and **WN9REM** worked; fair results on the schedule with WN9OKF. . . . **W9NVK**, Racine, has worked many WN9s in Illinois.

W9AFT, Milwaukee, is expected to be on with the new beam and the tower, according to WN9RNJ. . . . **W9BTI** is busy with 144 mc mobile. . . . **W9LPF** is to be on, again, with a new beam and a new tower, per W9AFT. . . . **W9GIP** is to have an outside beam. . . . **W9BTQ** QRL at the "saltmine." **W9DDG**, Sheboygan, is also QRL with the "green thumb" (gardening) project. . . . **W9FAN** isn't satisfied with his clipper circuit. . . . **W9LUQ** had troubles. . . . **W9NVK** deserves credit for representing Racine on the two-meter map. (**VHF Ed. Note:** That Racine gang once was prominent on vhf!) **W9UJM**, Hales Corners, Wisconsin, is feeling better, now, we're glad to report. . . . **W9LJV**, Waukesha, is heard regularly; has had some troubles with 144 mc airborne. . . . **W9YEG** is back on 2 with a good signal. . . . "Triple Y" is straightening out the beam situation. . . . **W9WTL** shows up on 2 only for the net, which is better than not at all. . . . **W9GZR** is kept busy with gas engines. . . . **W9ESJ** will get accustomed to traffic on two . . . **W9KQM** is QRL fixing "cyclops" (TV) and miscellaneous other items for others. . . . **W9TQ** had a visit from two prospective Novices wanting to clear BCI from the audio section of a "shiny, new cabinet." W9TQ's schedules with W9LJV, W9IMQ, W9PK, W9NVK, W9FAN, W9DDG and WN9OKF are successful, and certainly appreciated. DX and weather condition variables are of mutual interest to W9PK and W9TQ; schedule rechecks are made at midnight, when possible. . . . **W9FPE** visited the Milwaukee area; is now in Chicago area, relocating.

W9TQ caught the tail-end of the April 28 band-opening, working W9LUQ, W9LIR, W9ALE and W9GZH for nice QSOs. W9PK was heard better off the back of his beam than was W9SUV, so the estimate of the DX limit at 2330 was about 125 miles. Vic heard and called W9LF, Creve Couer, Illinois (near Peoria) several times, but no answer. The teletype schedule between W9DDG and W9TQ is usually solid, when the fellows get together. W9SKF has his "Iron Horse" working, now, and we have to get him on 144 mc for RTTY as well as the A3 gang, says W9TQ.

The Emergency Net, on 144.665, is busy building pack sets based on battery operation to permit complete freedom of movement. Other power units will be built, later. The size of the package has been determined by using the cases of the surplus ARR-1.



This is the typical 2-meter station package as produced by Jackson (Michigan) Amateur Radio Association. L. to r., power supply, omnidirectional antenna, receiver, transmitter and modulator.

W7CMX Reports Puget Sound 2-Meter Activity

"Two meters in the Puget Sound area of Washington is still very active and is becoming one of the best pipelines for 'grapevine reports' on the west coast. Stations heard in the Olympia area are: VE7MT, Victoria, BC.; W7BQX, Port Angeles; W7LBP, W7EOR, Everett W7EVO, W7EOP, WN7PRW, Seattle; W7BML, Bainbridge Island; W7EGV, Kent; W7LRF, W7LUF, W7MZS, W7NIL, W7MGN, W7MFG, WN7QZB, Tacoma; W7IEE, Mercer Island; and in Olympia, W7IJZ, W7HMJ, W7HPJ, W7KNV, W7NEY, W7DDY, W7NGZ, W7CMX, W7KLG, W7IG, and WN7PQR. There must be 10 or 15 other stations that have been heard in Olympia, but there just is no record of the calls, at present; certainly, the boys at Longview and Portland are coming in, and they should be included.

"DX, as spoken of in Texas and California, is out—here—but good, reliable communications up to 80 miles is being conducted, daily. We have a wide variety of cities involved in our 'Golden Frequency' (145.8 mc) such as Vancouver, B.C., Mount Vernon, Everett, Seattle, Bainbridge Island, Port Orchard, Port Angeles, Mercer Island, Kent, Tacoma, and—last but not least—Olympia. South of Olympia, the boys at the Longview Radio Club and Portland, Oregon, are going great guns on 146.25 mc.

"At the present time, 16-element 'Plumber's Delight' beams, for vertical or horizontal polarization, and 522 transmitters seem to predominate, although a number of 829B finals at 100 watts are crowding in with effective signals around the area. Some 3 and twin-3 beams are making their way in, helping to put the signal out, better.

"As for individuals, **W7MKW** has sold his two-meter gear and he now just listens; boy, can we give him the works. . . . **W7DDY**, Olympia, gets a good signal out of his Millen. . . . The Longview Radio Club has a pair of 24Gs on with 150 watts input and do very well. . . . Tommy Hutchins uses a 16-element beam, vertical or horizontal, whichever you want, and does a nice job with the 522. . . . **WN7PRW**, near Seattle, uses the same rig and gets comparable results. . . . **W7CMX** also has a 16-element beam, vertical or horizontal, and a 522. Many stations use ground-planes or vertical dipoles; they get out and normally do fairly well because the other guys have beams."

"Bish" **W7HEA**, Toppenish, Washington, is now on two meters with an ARC-5 and a horizontal 5-over-5 element beam; by the time you read this, Bish hopes to have 600 watts running into a pair of 4-125As.

"We are trying to build interest in two meters among the Novices, as well as among some of the old timers," says Bish, "but it's a tough battle around here. No DX has ever been worked from this valley, and most of the guys are just plain not interested. Their pioneer spirits died with the old folks, I guess. Hi!" (Stick to your guns, Bish. No DX was ever worked on any ham band until pioneering hams got on the frequencies and worked for it! On what kind of platters do our present-day "hams" expect their results to be given to them? —**VHF Ed.**)

Michigan Minutes

George D. Kerr, not yet a ham—but soon to be one—was selected by the Jackson Amateur Radio Association, Jackson, Michigan, to report its 2-meter activity to these pages. Thanks to George for a good report, and thanks to the association for the selection of a good reporter.

"GDK" says that the Jackson gang is on, every Wednesday night at 8:30 p.m. for the civilian volunteer net on 145.6 mc. After that, they scatter all over the band for a gabfest. At the last roll-call, 15 stations checked in from the Jackson area: WN8HKJ, W8RHB, W8JSK, W8WW, W8FMG, W8BAN, W8PYY, W8FYN, W8ZNI, W8DZW, W8KKB, W8RGR, all from Jackson; W8FRN, Jonesville; W8SSZ, **Hillsdale**; W8EEA, Coldwater.

The club recently finished construction of 15 transmitters for two meters. This project was conducted on a production-line basis. (See "Michigan Minutes" in "The VHF News" **CQ**, March, 1952, page 49, column 2.) The transmitters function as follows: the third overtone of an 8 mc crystal is tripled to 72 mc, then doubled to 144. The tube line-up is: 6J6—6J6—2E26, built on a chassis 3″ x 8″ x 5″. The accompanying picture shows a complete outfit, power supply, transmitter, modulator and antenna. The antenna is the answer to the switch-happy operator at the net control station. Before this antenna was derived, the net control beam was a whirligig; now, using the simplified array, signals from all directions are received without rotation. Stations within a 25-mile radius are heard "loud and clear." Coldwater and Lansing stations come in about S8. On Wednesday, April 23, it was reported that several of the gang heard Aurora, Illinois

COMPARE! COMPARE! COMPARE!



Fellows — NOW is the best time to trade for a new receiver or transmitter. Our stocks are complete — our prices are LOW. I'll give you the best deal on your used equipment. WRL gives you • TAILOR-MADE TERMS • LOWER PRICES • LIBERAL TRADE-INS • COMPLETE STOCKS • PERSONALIZED SERVICE. You'll benefit most by dealing with WRL, "One Of The World's Largest Distributors Of Amateur Radio Transmitting Equipment."

We Finance Our Own Paper—No Red Tape—No Delays

(Special attention given to foreign orders)

Leo I. Meyerson, WØGFQ



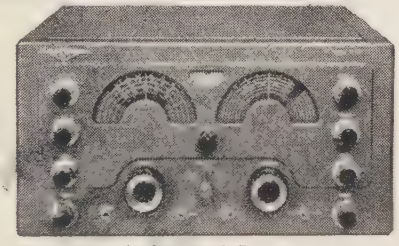
SEND TODAY FREE!
NEW 1952 WRL CATALOG

LEO GIVES BEST DEAL ON . . .

National NC RECEIVERS

NEW NC-183D RECEIVER

FIRST IN COVERAGE—SELECTIVITY—BANDSPREAD



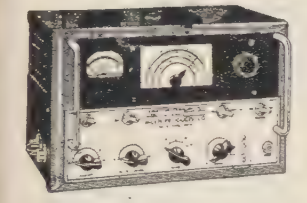
ON HAND FOR IMMEDIATE DELIVERY!
LOW DOWN PAYMENTS
$369.50
(less speaker)

WRL proudly offers the NC-183D — every feature you want in a truly modern receiver! Dual conversion on the three highest ranges (including 6, 10, 20 & 40 meter ham bands) — no "birdies"! Steep sided skirt selectivity with 3 I. F. stages (16 tuned circuits on the 3 high bands — 12 on all other bands, compared to 6 normally used) plus a new crystal filter. Approximately 1 microvolt sensitivity on 6 meters for a 10db signal-to-noise ratio! New, indirectly-lighted lucite dial scales! New bi-metallic, temperature-compensated tuning condenser for drift-free operation! Plus all the time tested features of the famous NC-183!

Truly it's the receiver of the year — see it, heart it, compare it!

NATIONAL RECEIVERS AND ACCESSORIES

HRO 50T-1 RECEIVER	$383.50
NC-125 RECEIVER	$149.50
SW54 RECEIVER	$ 49.95
SELECT-O-JET (#2 or #3)	$ 28.75
NFM-83-50 ADAPTER	$ 17.95
SPEAKER (for HRO 50-1 or NC-183D)	$ 16.00



NEW ELMAC-A54
Under-dash Mobile Xmtr.
For carbon mike input . . . $139.00
For dynamic or crystal mike $149.00
Power Supply, 110 Volt AC $ 39.50



New Log Book
25c
Full column log listing all FCC required info . . . accommodates 1,525 stations. "Q" signals, phonetic alphabet, amateur international prefixes.

RADIO REFERENCE MAP



25c
HANDY WALL SIZE

WRITE FOR DETAILED SPECIFICATION EQUIPMENT SHEETS

WRITE WIRE PHONE 7795

World Radio LABORATORIES

EVERYTHING IN RADIO

COUNCIL BLUFFS, IOWA

World Radio Laboratories, Inc.
744 West Broadway
Council Bluffs, Iowa

Please send me:

- ☐ New Log Book
- ☐ New Catalog
- ☐ Radio Map
- ☐ SW-54 Info
- ☐ NC-183 D Info
- ☐ HRO 50T-1 Info
- ☐ NC-125 Info
- ☐ Used Equipment List

Name_____

Address_____

City_____ State_____

(W9EQC), about 170 miles; he was called, but no contact was made. (**VHF Ed. Note.** On that night, W9EQC, yours truly, and others in the Chicago area enjoyed contacts with WN8HKH, Bangor, W8CVQ, Kalamazoo, W8BTL, South Haven, W8MRK, Muskegon Heights, W8EGX, Decatur, W8CZG, Battle Creek, and others.)

W8RHB has a 144 mc rig in his car, and demonstrated it while driving to the club meeting from his home in Concord, 15 miles southwest of Jackson. He was received very well all the way; the club had a portable station set up at its meeting place.

W8WRN's Ohio Report

WN8HPB, Phil Will (**VHF Ed. Note:** He should be nominated to columnist E. V. Durling's club, "My Name Is a Poem.") Canal Winchester, 15 miles southeast of Columbus, Ohio, is now on 2 meters. He uses a 5-over-5 beam, a Millen VHF transmitter, and a cascode converter employing a 6AK5, 6J6, 6AB4, 6AB4. The frequency is about 146.5 mc; he built the rig in a shielded cabinet with lots of filters and has had no reports of TVI.

"My old friend, George, W8BKI, Charlestown, West Virginia, has given up 2 meters," reports Ken. "He is no longer with the broadcast AM/FM station, there, so no longer has a good location for v.h.f. operation."

Jimmy, **W4OXC**, Louisville, Kentucky, is back on 2 and confirms that Floyd (ex-W4FBJ) is now W3SLI, Silver Springs, Maryland. Spring high winds also damaged the beam at W4MKJ, Louisville. . . . **W8CPA** and **W8WRN** definitely plan to attend the Turkey Run, Indiana, VHF meeting; Ken is working on a "surprise" guest from the south.

That old 6-meter man, W3BGT, Pittsburgh, Pennsylvania, is now on 2 meters with the "buffer"—he says—200 watts. Sam expects to have about 1 kw. going to VT-127As, soon.

The Republic of Texas Report

VHF Editor's Exclusive News: W9NFK, after 12 years in Chicago and Franklin Park, Illinois, moved to Houston, Texas, in early June as the proprietor of the new Texas Electronics Co. concerned with the installation, service and maintenance of v.h.f. communications equipment. Between getting settled, making a living and doing this column, Bill will be busier than the proverbial. . . . But, please still send your reports in to the address shown at the bottom of the first page of this column. Notice to all southerners and especially to Texans: Bill McNatt claims his full right to his "first papers" in the Republic of Texas by virtue of the fact that his parents were born and raised there; furthermore, his little boy, 'Gene, has been wearing a Confederate Army cap for more than six months, suh! And, on top of that, his wife, Helen, comes from the south of Racine (Wisconsin)! And, just furthermore, Bill was born in southern California.

Congratulations to John Naff, Port Neches, Texas, who is now W5TFW—the N was finally dropped as a result of John's perseverance with the code. May all two-meter Novices be so diligent! John says that the early arrival of hot weather produced a good east-west opening on the night of April 27. W5TDY, Thibedeaux, Louisiana, worked the Houston gang; W5ON, W5FEK and W5CVF put in very good signals. On the morning of the 28th, the path to the north was good. W5AJG, Dallas; W5AQS, Palmer; W5HHU, Dallas; and W5UHV were very strong. Also, W5CVW was finally worked; W5TFW had to use m.c.w., but he made it. A peculiar condition was observed—Dallas stations were very strong, but W5CVW in Fort Worth, only about 40 miles west of Dallas, was R5 but weak.

On May 6th another good coastal opening occurred and W5ONS, W5UB, Victoria; W5FEK, Houston; and W5TAF were very strong in Port Neches. That night, the band was open to the east. W5AIE, McComb, Mississippi, about 250 miles was the best DX heard. W5GIX, Baton Rouge, and W5HCM, New Orleans, were pounding in very nicely as was W5TDY. W5AOA, Sulphur, Louisiana, and WN5UJP were also heard. Texas activity was very good. W5AYU, W5FSC, W5FEK, W5CVF, K5FCN, W5ON, W5NHB, WN5VHR and W5HMM, all of Houston; W5OVP, LaPorte; WN5VDA/5, SeaBrook; W5QIO, W5QME and W5DSB of Beaumont; and W5TFW, Port Neches, all enjoyed the opening.

W5IRP, Lufkin, Texas, reports another excellent opening on May 10, extending from Victoria, Texas, to Jackson, Mississippi, about 475 miles. Bob worked W5NHB, W5UW, W5NZX, W5TFW, W5JTI, WN5VHR, W5TAF, and he closed the band with W5ONS. After completing medical school in Houston, Bob entered internship at the U.S. Naval Hospital, Great Lakes, Illinois, and will operate W5IRP/9 as soon as he can get set up.

W5FEK, Houston, reports that new two-meter stations in the gulf coast area are: W5TDY, Thibedeaux; WN5UJP and WN5URV, Lake Charles, Louisiana; W5Q[illegible] toria, Texas; W5AIE, McComb, Mississippi; W[illegible] and WN5UMC, Houston; WN5UVB, Beaumont; [illegible]ormerly of San Antonio, is now living in New B[illegible]

The South Texas Emergency Net convention [illegible]ville, on May 10 and 11 was attended by severa[illegible] two-meter gang: W5QKF, Corpus Christi, W5RA[illegible] Braunfels, W5ON, W5GLS, W5BHO, and W5F[illegible] of Houston.

Ontario and Western New York VHFers Meet

On May 16, the sixth get-together of the Onta[illegible] Western New York VHFers was held at Oakvi[illegible] tario, under the leadership of VE3BZP. About 115 persons enoyed Perry Ferrell's slide lecture [illegible] work with **RASO**. Ken Bowles, W2ZGP, gave [illegible] lecture on aurora propagation. In attendance [illegible] Ws, three SWLs from VE3-land, two XYLs, V[illegible] and VE3DER, the remainder of the group repre[illegible] Toronto, Hamilton, Kitchener, Brantford, Peterbo[illegible] Mountain View.

The seventh get-together of the group will [illegible] September 19th, on week after the close of the Ca[illegible] National Exhibition, under the guidance of the N[illegible] Falls, New York, v.h.f. amateurs with W2KEC in

Turkey Run VHF Meeting

Don't forget to write to Charles Hoffman, W[illegible] RFD 6, Terre Haute, Indiana, for information abo[illegible] annual summer meeting of midwestern VHF m[illegible] Turkey Run State Park.

In And Around Chicago

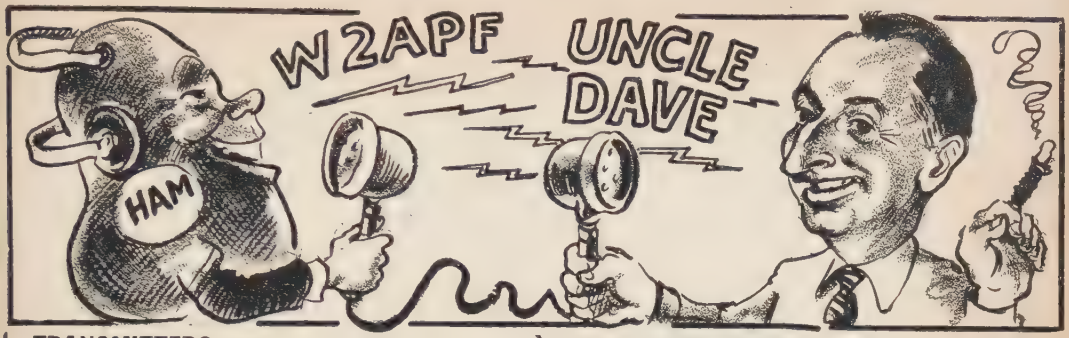
The write up on Clint Youle's weather reportin[illegible] the 2-meter gang in May CQ brought a nice plu[illegible] the magazine by Mr. Youle on one of his prog[illegible] W9NW and his ham weather reporters continue [illegible] a good job for the public and v.h.f. amateur radio.

The northern Illinois, Wisconsin, Indiana, and Mic[illegible] gang enjoyed one of the year's best openings on Ap[illegible] when W8CVQ, Kalamazoo, W8MRK, Muskegon He[illegible] WN8HKH, Bangor, W8CZG, Battle Creek, W8[illegible] Decatur, and of all the surprises, W8BTL, Al Labz, [illegible] Haven, Michigán! Al hasn't been on two for several [illegible] and it was certainly pleasant to work him again. [illegible] five years ago, W8BTL, W8AKR and W8CVQ were [illegible] sistent schedule pardners with W9BBU, W9IOD [illegible] others in the "across the Lake" tests after W9ZHB [illegible] W8CVQ (?) made it cross-band, 6 to 2, as I remem[illegible]

Leo, **WN9OKF**, is almost a "24-hour" station, oper[illegible] from his bed at Home in Park Ridge. About 32 Ch[illegible] area v.h.f. men met recently at Leo's home for [illegible] Midwest VHF Club meeting. . . . WN9PBK, WN[illegible] WN9PUW, WN9PUO, WN9REM, WN9RXS are a[illegible] of the Novices now active; there are several others [illegible] we can't quite keep track of them all. Bill Burke, W[illegible] is responsible for many of the new calls in ham [illegible] as a result of his many months of instructing [illegible] members in radio code, theory and construction. [illegible] **W9VNW** and **WN9OKF** have a friendly feud afire [illegible] who can work the most stations per month; this sh[illegible] help the "**STAPERMO**" contest scores being rec[illegible] by W9NW. W9JGA, W9PEN, W9UMD, W9CT, W[illegible] had better watch out. Wha' hoppen to K9FAS, O'[illegible] Field?

Al Tumas, **W9CPF**, is still fighting the effects of [illegible]ead poisoning; the gang is with you, Al. . . . The [illegible] mc FM "Party Line" Net continues active, day [illegible] night. It's really comical to observe the reactions of [illegible] of the boys when the others start throwing m.c.w. aro[illegible] even at less than Novice-class speed! The 147.5 [illegible] helped out greatly in the Chicago CYO Regatta, accor[illegible] to W9VEZ who reports that CYO officials were [illegible] impressed with the job that the 147.5 and the 10-m[illegible] boys did. The Medical Civil Defense Net, 147.5 mc [illegible] and the 29.640 emergency net both had equipment in[illegible] mobile emergency trailer built for the Chicago civil[illegible] fense show. W9LLX and W9KLB put in a lot of [illegible] work on the deal.

W9NFK said "Goodby" in late May to as many of[illegible] Chicago area 2-meter gang as he could. Bill boug[illegible] VHF communications service company in Houston, Te[illegible] and had to depart in a terrific rush. Reverting to [illegible] person expression, I regret that lack of time preve[illegible] me from saying goodbye personally to every ham [illegible] met during my 12 years in Chicago. Helen and I enj[illegible] every minute of time that we spent in Chicago w[illegible] met many wonderful people. Many fond memories [illegible] with us . . . the first Midwest VHF Club; the first [illegible]



TRANSMITTERS

Johnson Viking Transmitter Kit less tubes, mike or crystal	$209.50
Full Kit of Tubes	39.00
Johnson VFO Kit, less tubes	42.75
Kit of Tubes	2.89
Harvey-Wells TBS-50C Bandmaster Senior	111.50
Harvey-Wells TBS-50 D Bandmaster De Luxe	137.50
Elmac Portable Transmitter Model A-54, uses carbon mike	139.00
Elmac Portable Transmitter Model A-54H, uses crystal or dynamic mike	149.00
Collins Model 32V3 Transmitter, less microphones and crystal	775.00
Lysco Model B-129 Transmaster 10 meter, less tubes	29.95
Lysco Model A-175 Transmaster 75 meter, less tubes	29.95
Lysco Model A-140 Transmaster CAP meter, less tubes	29.95
Lysco Model 381 VFO, less tubes	26.95
Lysco Model 401 Modulator, less tubes	19.95
Eldico 2 meter transmitter kit Complete	49.95
wired and tested	74.95
Eldico GDO kit Complete	29.50
wired and tested	43.00
Millen 90651 Grid dip oscillator	61.50
Morrow Converters, Model 2BR for 10-75 meters	54.95
Morrow Converters, Model 3 BR for 10-25-75 meters	64.95
Gonset Model 3005 Tri-band Converter	47.60
Gonset Model 3008 2 meter Converter	44.50
Gonset Model 3002 3-30 meter Converter	44.75
Gonset Steering Post Bracket	3.90
Gonset Noise Clipper	9.25
Eldico 2 meter Receiver Kit, Complete	59.95
Eldico 2 meter Receiver wired and tested	89.95

RECEIVERS

Collins 75 A2 with speaker	$440.00
Hammarlund HQ-129-X with speaker	214.00
RME-50 with speaker	213.50
National new model NC-183-D with speaker	385.50
National HFS with power supply	164.43
National HRO-50T1 with speaker	395 50
National SW-54	49.95
Hallicrafters new model SX-73	975.00
Hallicrafters SX-62, less speaker	289.50
Hallicrafters SX-71, less speaker	199.50
Hallicrafters S-72 portable, less batteries	109.95
Hallicrafters S-72L marine band portable, less batteries	119.95
Battery pack for Model S-72	4.17
Hallicrafters S-76, less speaker	169.50
Hallicrafters S-77A	99.95
Hallicrafters S-40B	99.95
Hallicrafters S-38C	49.50
Hallicrafters S-80	44.50
Hallicrafters S-81	49.50
Hallicrafters S-82	49.50
Hallicrafters Speakers for models SX-62, SX-71, S-76	19.95
Mallory VP-555-H Vibropack output 300-VDC @ 200 ma	33.63
Mallory VP-557 Vibropack output 400-VDC @ 150 ma	33.63

BARGAIN SPECIALS

4, 5 & 6 prong ceramic sockets made by Johnson each	$ .20
GE plate circuit relay, 8000 ohm, DPDT contacts close @ 8 ma each	1.95



Single Button Carbon Hand MICROPHONES

$3.95 each

with push-to-talk switch, similar to T-17B ....MADE IN ENGLAND

Single button carbon hand	
72 ohm, one kilowatt win lead polyethelene insulation per ft.	.09
per 100 ft.	5.00
300 ohm Twin lead per ft.	.03
J-38 hand transmitting keys each	1.29
Pyrex ant. insulators, heavy duty type 7 inch each	1.40
Coax. cable RG8U, 52 ohm per ft.	.16
Coax. cable RG58U 52 ohm per ft.	.07
Coax. cable RG59U, 72 ohm per ft.	.09
Coax. cable RG11U, 72 ohm per ft.	.19
Rebuilt television picture tubes, guaranteed one year. All types available from stock (per inch plus your old tube)	1.20

VARIABLE CONDENSERS

	LENGTH	HEIGHT	WIDTH	EACH
MB70938 Capacity 3-26 mfd., .100 spacing	2	1¾	3¼	.75
MAPT6 Capacity 10-75 mfd., .100 spacing	3¾	2¼	2¾	1.20
MA60912 Capacity 10 mfd., .020 spacing	¾	1¼	1¼	.70
MA50986 Capacity 25 mmfd. per sec., .020 spacing, butterfly type	1¾	1⅝	1⅝	1.35

Acorn tube sockets made by EF Johnson for 954, 955, etc. tubes	.20
2 mfd. 1000 V pyranol cond.	2.95
2 mfd. 2000 V pyranol cond.	5.95
4 mfd. 3000 V pyranol cond.	9.95
Bias trans. 117 volt primary sec. 117 volt tapped at 104, 91, 78, 65, 52, 39, 26, 13 @ 40 ma	1.95
Clarostat 50 watt rheostats, 250 ohm	1.35
lots of 10	1.20
DeJur 50 watt rheostats, 50 ohm	1.25
lots of 10	.99
DeJur 50 watt dual 2000 ohm	2.50
lots of 10	1.98

USED EQUIPMENT

Hallicrafters SX-28, with speaker	$175 00
Hallicrafters SX-42, with speaker and tilt base	195.00
Hallicrafters S-72 Portable—LIKE NEW—less batteries	85.00
Hallicrafters S-20R	45.00
Bud VFO-21 variable frequency oscillator	42.00
Gonset 2 meter Converter—LIKE NEW	39.00
RME-69 Receiver with noise clipper and speaker	75.00
Hallicrafters SX-43 with speaker—LIKE NEW	160.00
Hammarlund SP-400SX with speaker and power supply	275.00
Harvey-Wells Bandmaster De Luxe—LIKE NEW	124.00
Harvey-Wells Bandmaster Senior—LIKE NEW	100.00
National NC240D with speaker	175.00

WRITE US FOR ANY OTHER ITEMS YOU ARE LOOKING FOR. THESE ITEMS CHANGE DAILY.
LIBERAL TRADE-IN ALLOWANCES.
FOREIGN TRADE WELCOME . . . ALL INQUIRIES INVITED . . .

FORT ORANGE RADIO DISTRIBUTING COMPANY, INC.

904 BROADWAY **ALBANY 7, N. Y.**

LONG DISTANCE PHONE: 5-1594 Cable Address: UNCLE DAVE

openings; the amazingly funny QSOs between W9DXZ ("If it doesn't work, something must be wrong!") and W9ELV, hearing W9IOD, W9BBU, W9WOK, W9PK, W9TKL, W9IPO, W9LWE, W9EQC, W9JIL and others work DX; the perennial QSOs between W9NW and W9GDM; W9WFC's success with the first W3GV beam in the Chicago area; W9FCN (the late Elmer Sweeney) and his expeditions to the Michigan sand dunes. Closing the band with W9ONO, W9KCW, W9NW, individually or collectively—a test of endurance; never did lick W9ONO, effectively, although one night W9VQS and I "matched" over the air to see who would call George on the phone at about 1:15 a.m. Yep, I got stuck; George almost got divorced; Floyd suddenly renewed interested in radio-controlled model airplanes! Then there were the visitng nights when the Aurora gang was host to the Chicago gang, vice versa. The older days, when **W9JPK** ("Just Plain Krazy, Beer-Barrel Hill, Milwaukee) was the station heard first and last when the lake-front openings occurred. And, so it could go on, for hours—memories of hilarious roundtables, spine-tingling band openings—the way W2BAV's signal tore up the whole Midwest a couple of years ago—enlightening technical discussions by the several engineers on the band, the way the band would come to life on an inactive night when certain W9s would "excitedly" call certain DX (there's no law against calling a station, that I know of) and, on and on!

Having already met many of the Houston, Texas, gang I look forward to close association with another fine gang of v.h.f. men. Next issue, the column will come to you from Houston.

THE FIFTH NORTHERN ONTARIO HAMFEST

This—in the fullest sense of the word, "sensational"—hamfest has been scheduled for three momentous days; Saturday, Sunday and Monday, the 28th, 29th, and 30th of June. Purportedly Canada's biggest and best, it is the fifth of an annual series of entertaining, intelligently planned festivals staged under the joint auspices of the Sudbury, Kirkland Lake and North Bay Radio Clubs. The nucleus of this year's activities will again be Camp Friendship, located two miles south of North Bay. The hamfest committee has provided, for your enjoyment, a party and dance for Saturday, a mobile treasure hunt, a program of games, and an evening banquet for Sunday, and on Monday, for a fitting denouement to the week-end revelry, a fifty mile boat cruise to French River. Write to Jack Barnaby, VE3TX, c/o Radio Station CFCH, North Bay, Ont., for accommodations and reservations.

Signal Corps Seeking Civilian Instructors

Civilian instructors in several communications skills are urgently needed near Augusta, Georgia, the Army Signal Corps said today. Jobs are at the Signal Corps Training Center, Camp Gordon, Georgia. Salaries range from $3,795 to $5,060 per year.

Instructors are needed in pole line construction, cable splicing, and manual teletypewriter-tape relay procedure. The Signal Corps is looking for former military teachers, or persons who have been trained in any of the following fields: telephone, central office maintenance, telephone installation and repair, pole line construction, communications equipment storage, communications center operations, power equipment maintenance, teletypewriter equipment maintenance, and cryptography.

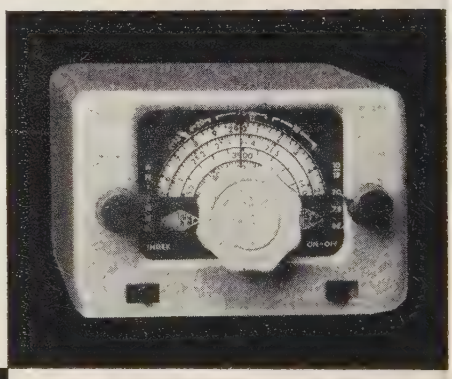
Interested persons should contact the United States Civil Service Commission, Board of Examiners, Camp Gordon, Georgia. Applications for Civil Service positions can be obtained at any post office.

Announcing the Sensational New

GONSET DELUXE MOBILE TRI-BAND CONVERTER

with

NEW OUTSTANDING FEATURES



- Now covers 15 meters, in addition to 10/11, 20, and 75
- Increased gain
- Still greater stability
- No B-C "leakthrough" on 75
- "HI-LO" impedance switch for 75 meter antenna input
- Plus the many other features which have sold several times as many "Tri-Bands" as all other makes of amateur converter combined.
- No increase in price

GONSET

$47.60 net

GONSET CO.
801 S. MAIN ST.
BURBANK, CALIF
send for latest bulletin

PLATT B-R-A-N-C-H-E-S OUT . . . OPENS NEW DOWNTOWN STORE!!

For the convenience of his many customers who like to shop in person, PLATT has opened a brand new branch store at 159 GREENWICH STREET, N. Y. C. (Mail Orders are to continue going to the main store and warehouse at 489 Broome St., N. Y. C.)

The new PLATT store is easily reached by the B.M.T., I.R.T., Hudson Tubes, and Independent Line. So why not visit PLATT'S Bargain Store today? You'll find many additional values that space does not allow us to list here.

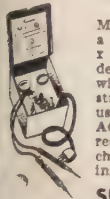


STORE OPENING SALE!!

TUBES! New! Jan! Boxed!

826	39c	864	19c
1625	29c	954	13c
VT-127	15c	E1148	49c
3C24	98c	2C26	9c
RK34	99c	2C26A	9c
304TH	$5.95	3D6	39c
1616	49c	15R	39c
1619	19c	39/44	29c
1626	19c	215A	9c
1629	22c	722A	99c
7193	19c	316A	29c
801A	19c	9006	19c
841	29c	9002	69c

TS-13 HANDSETS - BRAND NEW	$9.95
TS-9 HANDSETS - BRAND NEW	6.95
J-37 TRANSMITTING KEY - BRAND NEW	1.79
J-38 TRANSMITTING KEY - BRAND NEW	1.39



ARMY TEST UNIT 1-236

Meter is contained in a metal box 5½" long x 3¾" wide x 3¼" deep. Comes complete with test leads and instruction book. Can be used for testing between AC and DC measuring resistances of circuits, checking fuses and testing capacitors.

SPECIAL! $4.19



FIELD TELEPHONES

Army surplus, completely reconditioned and electrically tested, using 2 flashlight cells and a pair of interconnecting wires. GUARANTEED—like new.

ONLY **$20.95**



FIRE EXTINGUISHER TIRE INFLATOR

Made by leading Detroit Auto Mfr. Especially recommended for oil, gas and electrical fires. Guaranteed by mfr. against defects. Order two - one for your home; one for your car in case of flats or fires.

ONLY $2.29 each

20 LBS. ASSORTED RADIO PARTS

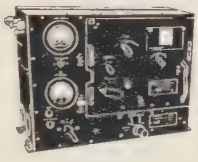


$2.79 You won't want to pass up this bargain - SO HURRY! - order now while it lasts!

RANGER AIRCRAFT INTERPHONE RECEIVER - Model 114-C

6 tube super-het., designed for operation directly from a 24V battery. Freq. coverage 200-550 KC. Audio output: 275 milliwatts, Wt. of receiver and jack box: 2 lbs. 22 ozs. 2 cables furnished: 1 connecting receiver to jack box and other shielded cable for connecting receiver to battery. BRAND NEW compl. with receiver, jack box JB-2, cables & operating manual.

$14.95



NEW! SHIP-TO-SHORE BC-223 TRANSMITTER

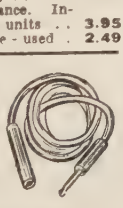
A 30 watt Transmitter, ideal for ship to-shore or Ham Rig. Crystal or MO control on four pre-selected channels. 2000 to 5250 KC. Use of 3 plug-in coils, five tubes: 2—801 and 3—46, and TU 17-18-25 tuning units.

TRANSMITTER	$39.95
TUBES	6.95
TUNING UNITS (TU-17 2000-3000 KC; TU-18 3000-4500 KC; TU-25 3500-5250 KC) - NEW IN ORIGINAL CASES.	5.50
PE-125 POWER SUPPLY for BC-223 - 12 or 24V input; output 475V 150 ma - BRAND NEW	20.95
SPARE VIBRATOR and TUBE KIT for PE-125 NEW	6.95
CABLE between TRANSMITTER and POWER SUPPLY - NEW	3.95

HEADSETS



HS-33 low impedance with cord and plug, used, fine condition	$2.79
HS-33 low impedance, BRAND NEW with ear pads, cord and PL54 plug	4.95
H-16/U high impedance. Includes two receiving units	3.95
HS-16 high impedance - used	2.49

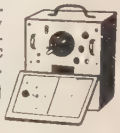


CD 307A CORDS with PL 55 Plug and JK 26 Jack, long cord

SPECIAL 79c

COMMAND TRANSMITTER — Navy & Army Type - 3 to 4 MC. 75% complete for spare parts - LIMITED QUANTITY . . . **$10.95**

BC-221 FREQUENCY METER

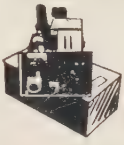


Real Value! QUANTITY IS LIMITED—so first come, first served. They are just like new, with original calibration charts. Range 125-20,000 KC with crystal check points in all ranges. Complete with crystal and tubes **$129.50**

MODULATED TYPE $159.50

MODULATED TYPE WITH AC POWER SUPPLY . . 179.50

These Frequency Meters are factory tested, checked for frequency alignment and GUARANTEED.

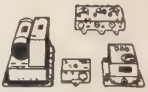


T9/APQ-2 RADAR TRANSMITTER

80/115 V 400-260-26 VDC. Designed primarily for aircraft operation. NEW **$23.95**

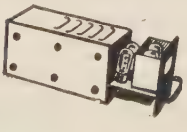


SCR-274N COMMAND and ARC-5 EQUIPMENT RECEIVERS



	USED	EXC. USED	NEW
BC-433 - 190-550 KC.		29.95	
BC-454 - 3 to 6 MC . .	8.95	9.95	
BC-455 - 6 to 9 MC. .	9.95	11.95	16.95
TRANSMITTERS			
A-958 - 2.1 to 3 MC. . .			29.95
BC-458 - 5.3 to 7 MC.	7.95	9.95	17.95
ARC5-T-19 - 3 to 4 MC		24.95	34.95
BC-459 - 7 to 9.1 MC.	13.95	15.95	24.95
ADDITIONAL EQUIPMENT			
BC-456 Modulator . . .	2.49	2.85	5.95
BC-450 Control Box (3 Receiver)	1.49	1.95	2.75
BC-451 Control Box (Transmitter)	1.29	1.79	2.39
BC-442 Relay Unit (ANT)	2.39	2.89	3.69
Plugs: PL-147, 148, 151, 152, 153, 154, 156 — EACH		1.25	
Flexible Shafting with gear to fit receivers . .			2.69
3 Receiver Rack	1.79	2.29	2.98
2 Transmitter Rack . . .	1.69	2.39	3.97
Single Transmitter Rack.			3.97
DM-32 Dynamotor for Command Set		3.95	5.95
DM-33 Dynamotor for Command Set		2.95	3.95
Shock Mounts for 3 Receiver Rack, 2 Trans. Rack, Modulator or Antenna Relay Unit. .		1.95	2.45

LIMITED QUANTITY COMMAND SET BC-455 — 6 to 9.1 MC. Excellent, 95% completely wired - a few minor parts included require assembling. Instructions included. . . . . **ONLY $7.95**



TURBO AMPLIFIER

4 tube Amplifier used by U.S. Air Force. 115V, input at 400 cycles. Without tubes - **BRAND NEW**

SPECIAL $1.19

MINIMUM ORDER $2.00 Immediate Delivery — Send 25% deposit on C.O.D. orders. All shipments F.O.B., N.Y.C. (N.Y.C. residents add sales tax to your remittance.)

PLATT ELECTRONICS CORP.

DEPT. C, 489 BROOME ST., NEW YORK 13, N. Y.

PHONES: WO 4-0527 and WO 4-0828

SURPLUS BARGAINS
NEW and USED
SPECIALS*

KITS OF COMPONENT PARTS

KIT #1—50 Composition Resistors, ½, 1 and 2 watt sizes.....$1.19
KIT #2—50 Postage Stamp and Domino Condensers 1.19
KIT #3—25 Wire Wound Resistors, 5, 10, and 20 watt sizes..... 1.49
KIT #4—25 Bathtub Condensers..... 1.49
KIT #5—10 Potentiometers, Asstd. 1.49

GIANT GRAB BAG--20 lb. Assort.
Assorted Radio Parts—Resistors, Condensers, Tube Sockets, Pots, Dial Lights, Chokes, Transformers, Knobs, Filter Condensers, etc.
Only **$3.98**

MISCELLANEOUS SPECIALS

RT-34/APS-13 Trans.-Rec. Less Tubes & Dyn. $2.49
BC-347 Interphone Amplifier with Tube 1.49
BC-434 Control Head—Complete.. 1.49
BC-357 Marker Beacon Receiver—Complete 2.49
BC-429 Receiver W/Coil 1.98
BC-430 Transmitter W/Coil 1.98
FL-5 Range Filter—New..... .29

YOUR CHOICE OF CONTROL BOXES.....Only 29c each
BC-461, BC-366, BC-334, BC-213, BC-651, BC-958, BC-335, BC-727, BC-765, ARB, C-48, BC-965

TUBE SPECIALS

1625—25c	7193—20c	371B—20c
1626—25c	211—20c	VT-25—15c
1629—25c	7C4—20c	VU-111—15c

2 METER SHIELDED TANK CIRCUIT COMPLETE WITH 955 TUBE $1.98

*Minimum Order $5.00 25% Deposit on C.O.D.'s

DAVE RUMPH CO.
P. O. Box 4178
FORT WORTH 6, TEXAS

NOISE LIMITER

(from page 26)

at which limiting begins. While the actual limit level may not be the exact calculated value un all operating conditions the difference will extremely small and may be neglected.

One of the main disadvantages of the sh type limiter is that since it never can be a perf short circuit it never will be able to clip t incoming signals of unequal amplitude such high amplitude noise pulses and lower amplitu modulation peaks, down to the same amplitu If the distortion can be tolerated, better act on the weak signals can be had by setting clipping level at 20 or 30% and if the distort is too annoying on the strong signals (where it w be more noticeable) the limiter can be switched The author has used a limiter set for clipping 20% and it was a great help to pull weak sign out of the ignition noise.

Tubes or Crystals?

Probably the most frequently employed di in noise limiter circuits is the 6H6. It will p form quite well as a limiter as will other vacu tube diodes of similar characteristics. If both s tions of the 6H6 are available for use in a sh limiter, it is recommended that each plate a each cathode be connected together. This will lov the internal resistance of the limiter and thus p duce better clipping action. A germanium crys diode such as the IN34 can be used in a sh limiter quite satisfactorily. There is little cha between the IN34 and the 6H6 as to the effecti ness of limiting in the high impedance circu encountered in the usual second detector/first au circuits. There will be some loss in available au voltage due to the shunting action of a crys since it will conduct slightly in the reverse dir tion. The germanium diode has the advanta however, of smaller size and can be wired in the receiver under the chassis without the necess for an additional tube socket and the heater wiri a tube limiter will require.

If variable selection of the modulation percei age at which limiting begins is desired, a potent meter can be used at *R2* instead of a fixed resist *R3* is connected to the moving contact of *(see Fig. 5(b))*. If *R2* is made equal to *R1* t clipping can be set to begin at any value betwe 0 and 100% modulation. The use of a varia limiter level control is especially useful for c reception. The usual second detector BFO circ is such that the detector will rectify the BF r.f. and produce a large bias voltage at *C1* regar less of the strength of the incoming signal. Th the effective percentage of modulation of the BF carrier by a weak incoming c.w. signal might considerably below the level of a limiter fixed 50% or so.

End of part one. Part two will appear in August

THE ARKANSAS HAMFEST

The Conway Radio League is sponsoring an Arkansas Hamfest, and has scheduled it for Sunday, July thirteentn, at Lake Conway, eight miles south of Conway, Arkansas on U. S. Highway 65. Planned in an old-fashioned picnic style, this one promises to be lots of fun and everyone is invited to come and share in the festivities. Officials of the Civil Air Patrol have been invited to speak of communications work in the CAP. Don't miss it.

FOURTH ANNUAL DOWN EAST HAMFEST

Additional information has been received regarding the Down Easter's Hamfest originally announced in our May issue. The Portland Amateur Wireless Association informs us that registration will take place on July 26th at 11 a.m. at the Eastland Hotel, in Portland. The banquet will be held at 6:30 p.m. Advance reservations should be made with Lee D. Johnson, W1QIQ, 92 William St., Portland, Maine. The registration fee is $4.50.

EGYPTIAN CLUB "PICNIC AND HAMBOREE"

The Egyptian Radio Club, Inc., of 700 South Chouteau Slough Road, Granite City, Ill., has scheduled its annual "Picnic and Hamboree" for July fourth of this year. It will be held at the club house grounds, located one block south of the New Chain of Rocks Canal Bridge on highway 66 between Mitchell, Illinois and the Mississippi river.

There will be no admission charge this year. Food and drinks will be available on the grounds, and the entertainment committee has planned contests and prizes of all descriptions, in order to make your day interesting and amusing. This festival is a prerequisite of a memorable Fourth of July week-end.

EVERYTHING AT YOUR FINGERTIPS with **SUBRACO MT-15 X**

GO "DASHBOARD" MOBILE —



The "ORIGINAL DASHBOARD XMTR"

WITH TUBES
$109.50 Hi-Imp. Input
— • —
$99.55 Low-Imp. Input

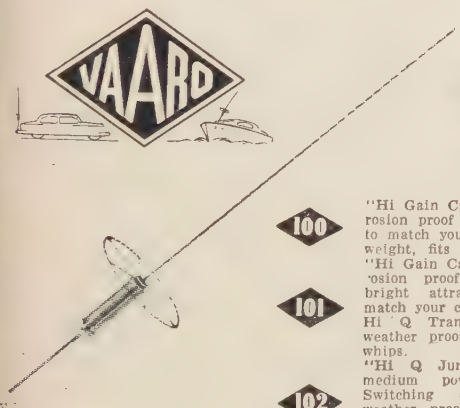
. . . with this high quality, compact, efficiently designed, 30 watt AM phone, 10-11 MTR., transmitter, small enough to mount in most glove compartments or under any dash. For complete details write for catalog C-752.

SUBURBAN RADIO COMPANY
158 CENTRAL AVE. ROCHELLE PARK NEW JERSEY

VAARO

It's R9 Plus . . . when using a "VAARO ANTENNA"

Presents: The first all band switching mobile and marine antenna system. 2Mcs to 30Mcs. Completely weather proof in high seas or rainy mobile days, available with or without capacity hat.



100 "Hi Gain Capacity Hat" corrosion proof in various colors to match your car, very light weight, fits all whips.

101 "Hi Gain Capacity Hat" corrosion proof anodization in bright attractive colors to match your car, complete with Hi Q Transparent buterate weather proof shield, fits all whips.

102 "Hi Q Junior" air wound medium power All Band Switching coil, completely weather proof, no change of loading in rain or snow, fits all whips.

103 "Hi Q Master" air wound high power weather proof coil, operate all bands in your car without inconvenience of coil changing or other unpleasant operations, one second band switching, fit all whips.

104 New all fiberglass amateur, civil air patrol or marine whips, designed to be used in conjunction with any above units, completely corrosion and weather proof, no insulators or springs needed.

105 "Bumper Mount" completely new design, don't chop holes in your new car, heavy construction and corrosion proof, lends beauty to your installation, designed to fit any bumper, special bumper curvature insert furnished, no drilling or machining necessary to install, just bolt on.



VAARO ELECTRONIC ENGINEERING COMPANY, BOX 5035 LONG BEACH, CALIFORNIA

Please send me C.O.D.—F.O.B. CHECK ANY OF THESE:

VAARO 100	☐ $ 3.95	VAARO 103	☐ $14.95
VAARO 101	☐ 5.95	VAARO 104	☐ 5.25
VAARO 102	☐ 8.95	VAARO 105	☐ 8.25
		SEND LITERATURE	☐

NAME .....
ADDRESS .....
CITY ..... STATE .....
COLOR DESIRED .....

PROGAGATION

(from page 32)

USA and Australasia. Referring to figure 1, we see that the lowest usable frequency (LUF), which is a function of solar absorption and atmospheric noise, does not exceed 20 mc. for West Coast circuits. If this is so, some good 15 meter openings can be expected. However, at the present stage of the are of propagation analysis, it is rather difficult to interpret absorption and noise factors on these exceptionally long circuits. I would appreciate reports of QSO's made on these circuits, indicating time of QSO, power and antenna used and RST rating. These reports may enable an evaluation of the accuracy of the factors used for determining absorption values on these long circuits. . . .

High absorption will definitely keep 20 meter signal levels down, but the band is expected to open to all areas of the USA during the hours the path is in zones of twilight or darkness. . . .

Fewer 40 meter openings are expected in July than occurred during the Spring months, and rather poor DX conditions are expected for 80 meters with few, if any openings possible.

ASIA

No ten meter openings expected until early Winter. . . . Some 15 meter openings possible from the USA West Coast to the Far East, nothing expected on 15 from the Central or Eastern sections of the USA.

On 20 meters, some openings are expected to most areas of Asia. from all sections of the USA. Signals will probably be extremely weak until a few hours after local sunset when signal intensities should increase. In this month's Propagation Tables, there is indicated next to Asiatic paths, that have a tendency to arrive over a long or short route, either an A or an E. A indicates that the path will most probably arrive from over Asia, E indicates that the path will most probably arrive from over Europe. . . . High noise levels and absorption will not permit many openings on 40 or 80 meters except possibly from the Pacific Coast to the Far East or from Eastern USA to the Near East.

DX and OVERSEAS

(from page 49)

BRAZILIAN 21MC PHONE/CW CONTEST:

WHEN: Phone section week-ends of July 5th and 19th. 0301 GMT Sat./6300 GMT. Mon. CW section week-ends of July 12th and 26th. Same times.

WHEN: Phone section week-ends of July 5th and invited to send their reports to LABRE, the following data: Time, GMT, Call Box 2353, Rio de Janeiro, Brazil. with sign of PY stations QSO'ing and series of figures sent by calling station. 2 points will be credited for each correct copy. The same PY station may be logged again providing there is a difference of two hours between last copy. Winners and second placers will be awarded special certificates in each country. (THESE RULES WILL BE MODIFIED SHORTLY TO ALLOW FOR ACTUAL QSO's WITH PY STATIONS.)

HZ1MY Dick McKercher, Box 167, Jedda, Saud Arabia.

KX6AH 1960 AACS, Navy 824 Box 11, PM, S Francisco.

W3ENK/KG6 (KZ5CB/W2AOS) Cmndr.Chas.E.Biel Naval Communication Station, Navy 92 FPO, San Francisco, or, via W3 bureau.

BOUND

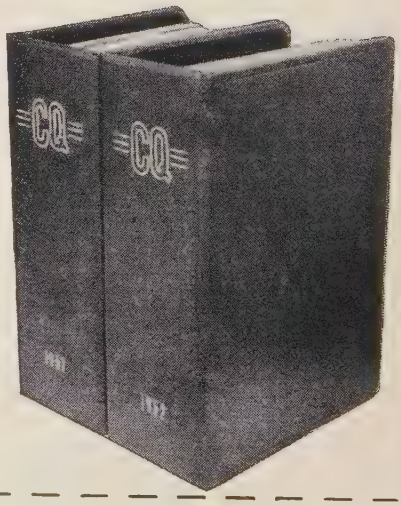
To Give Greater Value

By keeping your copies of "CQ" in a BINDER, you have the finest reference library on ham radio right at your finger tips.

This handsome, red fabricord, steel reinforced binder holds a full year's copies of "CQ." Each magazine can be inserted or removed at will.

Price $2.50 postpaid*

*(Foreign Orders add 25c per binder)



CQ Magazine

67 West 44th St., New York 36, N. Y.

Enclosed find $..... for ..... binders

Name ..... Call .....

Address .....

City .....Zone ..... State .....

Year to be stamped ..... Heading: ☐ CQ, ☐ Plain

A HETERODYNE EXCITER

(from page 19)

three planes. The panel is marked with decals which are easy to apply, fine looking, and low in cost.

This exciter has been in use for some time in a fringe area and there have been no TVI reports whatever. The unit is in a standard metal cabinet with none of the usual TVI precautions such as low pass filters in the feed line, screening of the lid, etc. All in all the exciter works like a charm and a few hours on the air with it will spoil you for any other exciter.

SCRATCHI

(from page 4)

diggeditys, now I going to get even with that movie manager, I shorting out speaker, calling HELLO TEST a cupple of times, and sure enough, can faintly heer voice coming from other neerby cars. Wowie! Whatever I say in mike coming out and being heard by all cars watching the movie. What an opportunity!

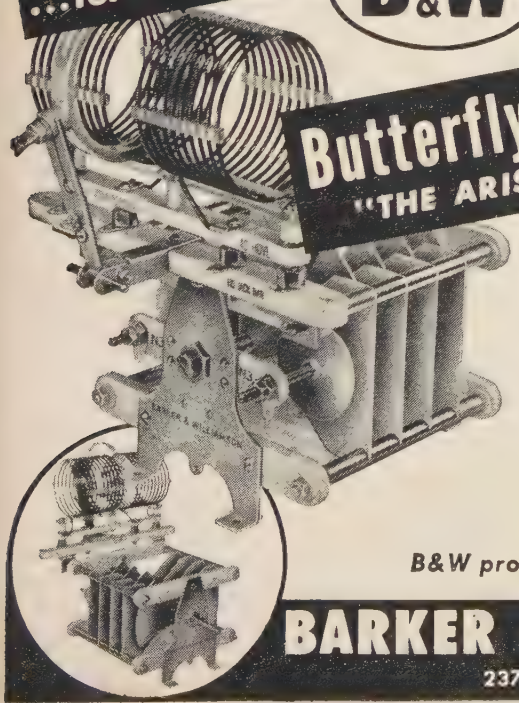
By turning on speaker, can heer the movie, then by turning it off can make comments to everybuddy. First chance are coming when hero and heroine are clutched in mad embrace. I making sound of reel joocy kiss. From here on, things are reely picking up. The hero are saying "darling, I am mad, mad, mad about you," and then I saying into mike "if you asking me you just plain crazy." And then . . . but, Hon. Ed., there are no cents in boring you with the detales. I are having more fun than anything. Everybuddy watching the movie are laughing themselves sick, and finally the manager of the drive-in are deciding enough is enough, so he putting notice on screen that everyone would be getting money back and there would be no more show that night. Fine spoil-sport he turned out to be!

At this moment I deciding I'd better be unhooking my lead-in wire and getting out of there but quicklike. Stooping under fence, are just about to get wire when I see the manager coming toward me on dead run. Oh-oh, I are saying to myself, forgetting two-bits piece of wire and get going. Hon. Ed., I are having 100 foots head start, and I are a fast runner, so should have had no trouble making getaway. All except for one thing. Just one small thing. You see, when getting into car, and stepping on starter—nothing. Hon. Battery are dead.

From this point on it are long, sad tale. Movie manager can't decide whether to sueing me for money he refunding, or just asking for death penalty. Matter of fackly, I happy to be in jale, after seeing how mad movie manager are.

At the moment it looking like I may be getting out soon, on acct. the jale grapevine are telling me that judge are deciding to release me after taking away my amchoor license. That'll be the day. I'l settle for that. Telling me, Hon. Ed., what you thinking Hon. Judge will doing to me when he finding out I not having any amchoor license? Be seeing you in 30, 60 or 90 days.

Respectively yours,
Hashafisti Scratchi



. . . for heavy duty!

B&W TYPE CX

Butterfly Variable Capacitors

"THE ARISTOCRAT OF ALL VARIABLES"

Perfect electrical and mechanical symmetry.
Short R-F paths.
One unit assembly of coil and capacitor.
Built-in neutralizers optional.
Provides maximum compactness in high-powered final stages.
Extra heavy, highly polished, rounded edge plates.

Mounting brackets for vacuum condensers are available for padding and extending the tuning range for low-frequency operation. Type CX capacitors are supplied with air-gap spacings of .500"—.375"—.250". Standard plate thickness is $\frac{1}{16}$", but $\frac{3}{32}$" plate can be supplied on order. Write for catalog.

B&W products are featured by leading distributors

BARKER & WILLIAMSON, Inc.

237 Fairfield Ave., Upper Darby, Pa.

PROVE to yourself in 7 DAYS that you can

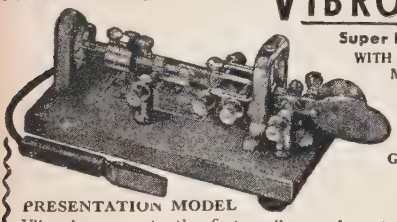
PASS FCC RADIO EXAMS for AMATEUR and COMMERCIAL easily, quickly—or NO COST!

Only 15 Minutes A Day With This Amazing New "Hear and See How" Low Cost Home Study Method For Passing Amateur Code and Theory Exams and Commercial Code Exams — From $6.95

With this method you ACTUALLY SEND and RECEIVE messages as you practice. You learn code and theory immediately from records and books, at your own convenience. Valuable sturdy Hand Key and High Frequency Buzzer included FREE for practicing. Typical practice FCC code and theory exams included. FREE consultation privileges. Hundreds have received their licenses with these courses. Write today for FREE information.

AMERICAN ELECTRONICS CO., Dept. C-7
1451 Wilkins Avenue New York City

AMAZING NEW VIBROPLEX



Super DeLuxe WITH ADJUSTABLE MAIN SPRING AND OTHER GREAT FEATURES 24-K GOLD-PLATED BASE TOP

PRESENTATION MODEL $29.95

Vibroplex presents the first really speed control key. An adjustable main spring permits operator to send slower or faster as desired. No more muddy signals . . . no sacrifice of signal quality. Suits any hand or any style of sending. Free of arm tension. Sends easily as pressing a button. Praised by operators and beginners alike. Try this new Vibroplex key! You'll be delighted. Other new popular Vibroplex keys from $12.95 up. At your dealer or
THE VIBROPLEX CO., INC. 833 Broadway, N. Y. 3, N. Y.

FOR SALE:

Back issues of CQ

Jan.—'51	Aug.—'45, '46, '47, '49,
Feb.—'46, '47, '48, '49, '50, '51	'50, '51
	Sept.—'45, '46, '47, '48, '49, '50, '51
Mar.—'46, '47, '51	
Apr.—'46, '47, '48, '50, '51	Oct.—'45, '46, '47, '48, '49, '50, '51
May—'46, '47, '48, '50, '51	Nov.—'45, '46, '47, '48, '50, '51
June—'46, '47, '48, '50, '51	Dec.—'46, '47, '48, '49, '50, '51
July—'46, '47, '50, '51	

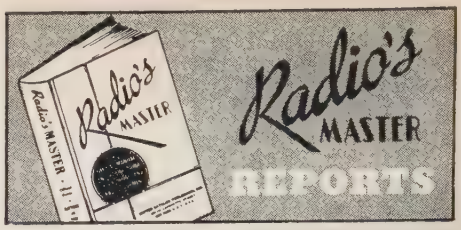
PRICE: **50c** each

1952 Issues: **35c** each

Exception: May, 1952—50c

CQ Magazine

67 West 44th St. New York 36, N. Y.



To those of you who are ready to buy (or even to sell), these Reports will give you the latest price changes as well as the new and discontinued products. This monthly summary of the market is supplied by RADIO'S MASTER, The Industry's OFFICIAL Buying Guide, published by United Catalog Publishers, Inc., New York City. A complete description of each product is found in RADIO'S MASTER 16th Edition.

ANTENNAS & ACCESSORIES

Wincharger Corp.—Guyed towers #9454 and #9455 are once again being sold by Wincharger at $31.50 and $18.60 net respectively.

MISCELLANEOUS RADIO, TV AND ELECTRONIC PARTS

EBY Sales—Added K-302 kit at $3.69 net and 49-13 DD electrostatic TV socket at $ .48 net.

James Vibrapowr—Added new vibrator J-74 which is, as stated, equivalent to Raytheon #B-21A-12291, mobile communications.

Mallory & Co.—Increased prices on their VA series power supplies.

Sangamo Electric—Withdrew type 13 television paper tubular capacitors . . . type FM 15 electrolytic capacitors.

Technical Appliance Corp.—Reduced prices on #873-3, change-over switch (2 or 3 circuit) to $1.80 net.

RECORDING EQUIPMENT, SPEAKERS, AMPLIFIERS, NEEDLES, TAPE, ETC. . . .

Electro-Voice—Added model 430 utility floor stand at $10.20 net and model 423-G desk stand. Electro-Voice advises that the restrictions on the use of zinc are off and that manufacturing is now underway on their full line of stands.

Markel Electric Products—Added model 74-P at $72.00 net and 75-P at $78.66 net, playmaster 3 speed record changer equipped with Pfan-tone standard and microgroove high fidelity pick-ups.

Miller Mfg. Co.—Added 3 new replacement cartridges for Astatic . . . 1 for Electro-Voice . . . 1 for Magnovox . . . 3 for Shure Bros.

Presto Recording—Added Y-5 recorder (for low impedance mike) at $771.00 list . . . T-99-H, dynamic microphone at $32.50 list . . . A-15-S, floor stand at $10.00 list and L-2 transcription player at $290.00 list.

Wharfedale (British Industries)—Added 3000 cycle crossover at $13.50 net.

Wilcox-Gay—Increased price on #2A10, 2 speed tape recorder to $159.95 retail price.

TEST EQUIPMENT

Supreme Inc.—Decreased prices on DC Microammeters models 2100, 2400, 3100, 3400, 4100 in ranges 0-50, 0-100, 0-200 and 0-500. Decreased prices on model 3100 and 3400 DC Voltmeters ranges 0-1, 0-3, 0-5, 0-10, 0-25, 0-50 to $9.25.

TUBES—RECEIVING, TELEVISION, SPECIAL PURPOSE, ETC. . . .

National Union—Increased price of 263 radio receiving tubes . . . decreased price of 27 . . . added 11 new ones.

Raytheon—Increased prices on 231 radio receiving tubes . . . decreased prices on 22 . . . withdrew 37 others. Advised of 50 new special purpose tubes . . . discontinued 54 . . . decreased prices on 83 and increased prices on 17 others.

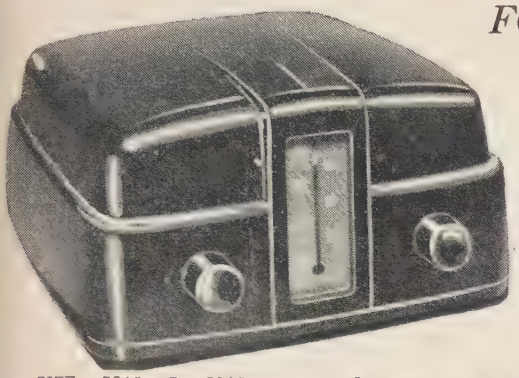
Sylvania—Reduced prices on 9 silicon crystal diodes . . . 7 germanium diodes.

Thomas Electronics—Decreased prices on 20 CR tubes.

Tung-Sol Electric—Increased prices on 167 radio receiving tubes . . . decreased prices on 10 . . . added 120 new ones.

110V. A.C. THYRATRON REMOTE CONTROL

FOR LESS THAN COST OF THE RELAY ALONE!



SIZE - 5¾" x 5 x 3¼"

A $16 Value— Yours For $3.88

Manufactured by Nationally Famous Firm.
Sorry, we cannot mention name.

Here's absolutely the greatest electronic buy in years! We were able to pick up these amazing units at a fraction of the manufacturer's cost and we're passing on this tremendous savings to radiomen who appreciate a genuine bargain. Adapt them for 1,001 uses, or use 'em for parts. Total value of its parts alone is $16.50—yet for only $3.88 (less tubes) you get a completely wired and tested 110 volt, 60 cycle AC Thyratron Circuit Remote Control.

These fine Thyratron precision thermostatic controls can be modified by you easily and quickly for electronic remote control of: Transmitters; Turn Radio or TV on and off; Remote Control of Appliances, Machinery, Power Tools; Remote Control for Model Railroads, Planes, Boats, Trucks; Burglar, Fire, Temperature and Rain Alarms; Poultry Brooder Controls; Remote Thermostatic Controls, etc. Your own ingenuity can devise many more interesting and practical uses which this remarkable unit can control for you.

Remote Control Unit Contains:	
Plate Relay Worth	$ 4.00
Filament Transformer Worth	2.50
Controls, Resistors, Sockets, Condensers, Chassis Worth	10.00
Total Value Parts Alone	$16.50

(10 Days Net to Rated Firms.)
Send Check or Money Order Only.

$3.88
No C.O.D. Postpaid in U.S.A. Only

FREE A Complete Circuit Diagram sent with each unit.

MANUEL KLEIN CO.
94-C CHAMBERS STREET
NEW YORK 7, N. Y.

Have you noted . . .

that CQ has a new appearance and has been revitalized? It now contains the best feature articles and departments available for the money today. By subscribing now you are sure of getting each issue and missing none of the swell material to be published in the months to come.

One Year .....$3.00 Two Years.....$5.00
in U.S., U.S. Possessions, Canada and countries in the Pan American union. All others $4.00 per year.



CQ-7

CQ MAGAZINE
67 West 44th St., New York 36, N. Y.

Enclosed find $..... for a .... year subscription
to be sent to: ☐ New ☐ Renewal
Name .... Call .....
Address .....
City ..... Zone ..... State .....



our finest SPEED KEY

Complete pivot, contact tension and excursion adjustments; live steel vibrator spring, vibrator damping wheel and carefully aligned ¼" silver contacts assure perfect dots throughout speed range. Adjustable paddles for maximum operating comfort.

Heavy steel base and all machine parts beautifully chrome plated. Equipped with circuit closing switch; non-slip rubber feet. Weight 4½ lbs.

Catalog No. 114-501
Amateur Net $15.00

E. F. JOHNSON CO.
WASECA, MINNESOTA

YOU GET 2

Absolutely the greatest cabinet buy in years.



101 uses for this sturdy handsome black plastic cabinet. Can be used for TV boosters, remote control units, meters, etc.

A GENUINE BARGAIN YOU CAN NOT AFFORD TO MISS

2 for ONLY $3

Postpaid anywhere in the United States

Size: 5¾" x 5" x 3¼"

No C.O.D. Send check or money order.

MANUEL KLEIN CO.
94C CHAMBERS ST., NEW YORK 7, N. Y.

8 WIRE CONTROL CABLE

Two No. 16, Six No. 20 tinned, stranded, copper, rubber insulated coded leads. Waterproof rubber jacket. Woven copper armor shield overall. Wt. 16 lbs./100 ft. Lengths to 400 ft. LOW PRICE FOB warehouse. Minimum order 100 ft. Shipment is made by Railway Express—shipping charges collect. 5c ft.

TRANS-WORLD RADIO-TELEVISION CORP.
6639 S. ABERDEEN ST. CHICAGO 21, ILL.
Phone: AUstin 7-4538

WE WANT . . .

Surplus Test Equipment, Transmitters, Receivers, Radar Equipment, Navigational Aids; Marine & Airborne Equipment; Tubes. Be sure to name your price and furnish full details. Write now to;

RADCOM ENGINEERING CO.
8 Livingston St., Newark 3, N. J.

ANTENNA RESONANCE

(from page 42)

With either method of tuning, *L2* should b mounted near the feedthrough point in the bod but a clearance equal to at least one coil diamete should be maintained between any part of the bod and the inductor. If the variable tuning capacito

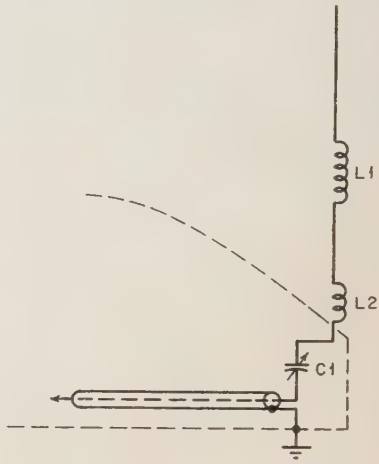


FIGURE 3A

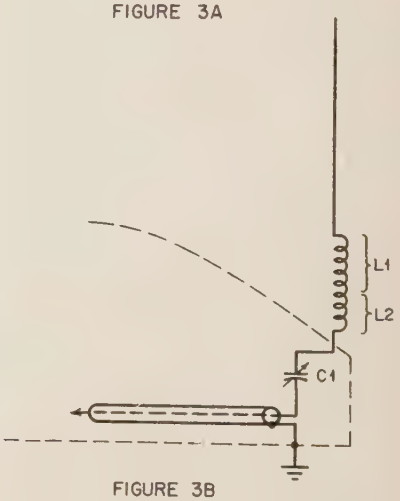


FIGURE 3B

Applications of the author's design.

is used, *L2* may be mounted outside at the base o the antenna (*Fig. 3A*) and tuning should initially be made at the lowest frequency with *L2* and *C* short circuited. If the antenna is a base loaded affair, *L2* may be made part of the normal loading inductor (*Fig. 3B*) and in this case, the initial tuning of the loading inductor, at the lowest frequency, should be made with both *L2* and *C1* in the circuit. *C1* should be set at maximum capacitance. Base loading, of course, may also be used with the variable inductor, but the latter must still be mounted in the trunk for control purposes.

(Continued on page 69)

MEN of RADIO

PART III

(from page 36)

tors and became the most important factor in commercial wireless. There were rivals, many of whom made very valuable contributions to progress, but for many years control of a major portion of the industry rested with the Marconi Company.

Guglielmo Marconi, designer of the first practicable wireless equipment and founder of a vast industry, went on to discover a system of concentrating radio waves into a directional beam, invented many improvements in radio apparatus and made valuable investigations of high-frequency radio waves. His yacht Elettra was virtually a floating laboratory and it was aboard this craft that he conducted many of his investigations. Many honors were conferred upon him, including decorations in Great Britain, Russia, Spain and The United States. In 1909 he received a Nobel prize for physics, in 1915 an Italian senatorship and the title of Marquis in 1929. He died in 1937.

From a technical point of view, the development of radio sending and receiving equipment during the first few years of the Marconi Company's existence was not only very important but rather interesting. During most of the period, the spark or induction coil continued in use as the principal, if not the only, method of generating radio waves. The input power to the coil was constantly increased however; where Hertz had used a relatively low-powered coil supplied by a wet cell battery, Marconi commercial apparatus employed coils having an input power ranging from perhaps 250 watts to several kilowatts. Obviously, it would have been impractical to operate such coils from a battery, hence the transition to a motor generator set as the source of power was soon made.

An early Marconi transmitter and receiver are illustrated in *Fig. 1.* In this example, the coil is powered by a battery, *B* and the antenna and ground are directly connected to the spark gap, *SG.* At the receiver, the coherer, *CO* is connected between antenna and ground; note that no attempt is made to tune either the transmitter or the receiver. Direct current flow through the coherer energizes the relay, *RY;* closing of relay contacts provides a path for operation of the telegraph sounder *S* from the local battery *LB.* Of course, if a telephone receiver was used in place of the sounder, the relay was not needed. Due to the fact that the coherer filings tended to cling together even after the radio signal had ceased, some method of stopping current flow through the relay at the end of each wave train had to be provided. This was generally accomplished by means of a "decoherer", a device resembling an electric bell with the gong removed. Current flow through the coherer energized the bell magnet, causing the clap-

EASY TO LEARN CODE



It is easy and pleasant to learn or increase speed the modern way—with an **Instructograph Code Teacher.** Excellent for the beginner or advanced student. A quick, practical and dependable method. Available tapes from beginner's alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready, no QRM, beats having someone send to you.

ENDORSED BY THOUSANDS!

The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the **Instructograph System.** Write today for full particulars and convenient rental plans.

INSTRUCTOGRAPH COMPANY

Dept. C., 4701 SHERIDAN RD., CHICAGO 40, ILL.

WANTED *WE NEED YOUR SURPLUS ELECTRONIC EQUIPMENT*

WE PAY TOP $$$ FOR:

RADIO RECEIVERS
TRANSMITTERS
ARC-1
ARC-3
ART-13
CONTROL BOXES
INDICATORS
AN CONNECTORS
CLAMPS
PLUGS
CORDS
RELAYS
TELEPHONE MATERIALS
WE BUY ANYTHING!

WRITE, WIRE TODAY!
TELL US WHAT YOU HAVE

TALLEN COMPANY, INC.
Dept. CQ,
159 CARLTON AVE. BROOKLYN 5, N. Y.

ATTENTION MOBILERS

Give your 10 meter mobile rig fixed station effectiveness when at vacation QTH or parked.

USE THE SPECIAL M/M ANTENNA

In five minutes or less you can have perfect match, sensational results.

Complete with suspension, coax fittings and 60 ft. trans line 50 or 72 ohm. $19.95
Featherweight model 72 ohm $14.95
Omnidirectional models slightly higher.

LAKE SERVICE CORPORATION
89 Brighton Avenue Boston 34, Mass.

SPECIAL
HALLICRAFTERS SX71-S76
Write for liberal trade-in offer.
FILAMENT TRANS. 6V at 3 Amps.,
$1.45

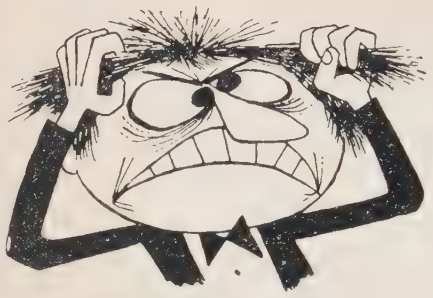
LOOK—NO HANDS!
Head & Chest Set consisting of Single Button Carbon Microphone with Chest Plate, Switch, Straps, and Pair of Earphones. Ideal for Mobile Operation. Can be used less earphones . . .
Only .....**$1.95** complete
ATRONIC CORP., DEPT. C-19
1253 Loyola Ave., Chicago 26, Ill.

THIS AD MAY BE SMALL — BUT IT CAN MEAN B-I-G MONEY TO YOU!

I want to buy BC-348, BC-342, BC-312, ARC-1, ART-13, BC-788, I-152, T-17 MKS. BC-221 or any parts thereof, no matter how small. In fact, I'll buy anything. I'm not kidding! Let me prove it!

Wire or write: BOB SANETT
4668 Dockweiler, Los Angeles, Calif.
Telephone: YOrk 4637

"WE'RE TEARING OUR HAIR OUT . . . "



TO BUY THIS EQUIPMENT!

WE NEED	WE'LL PAY
ATC or T-47 type ART-13	up to $250.00
BC-348	up to 70.00
BC-312	up to 70.00
BC-221	up to 45.00
R5/ARN-7	up to 45.00
TS-251	up to 175.00
FL-30 or F-21/ARA-9 Audio Filters . . . ea.	up to 6.00

WANTED ALSO: TS-147, TS-148, RTA-1B, MG-149, plus parts or components. In fact we'll buy practically anything in this field. Phone, Wire or Write:

V & H RADIO & ELECTRONICS SUPPLY CO.
2033 W. Venice Blvd., Los Angeles 6, Calif.
Telephone: REpublic 3-1127

REPAIR PARTS FOR BC-348 (H, K, L, R only)
Also BC 224 Models F, K. Coils for ant., r.f., det., osc., I.F., c.w. osc., xtal filters, 4 gang cond., front panels, dial assemblies, vol. conts., etc. Write for complete list and free diagram.

HIGH QUALITY CRYSTAL UNITS
Western Electric—type CR-1A/AR in holders, ½" pin spacing Ideal for net frequency operation. Available in quantities. 5910-6350-6370-6470-6510-6610-6670-6690-6940-7270-7350-7380-7390-7480-7580-9720 All fundamentals in KC. Good multipliers to higher frequencies . . $1.25 each
ELECTRONICRAFT, INC., 27 Millburn St., Bronxville 8, N. Y.

ARC-5 TRANSMITTER COILS

MASTER OSCILLATOR

#6029	3-4 MC	$1.85	#6030	4-5.3 MC	$1.75
#6031	5.3-7 MC	1.65	#6032	7-9 MC	2.35

POWER AMPLIFIER

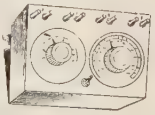
#7247	3-4 MC	$2.19	#7250	7-9 MC	$2.98

ANTENNA LOADING

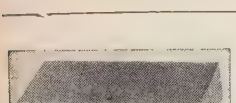
#6033	3-4 MC	$1.39	#6034	4-5.3 MC	$1.25
#6035	5.3-7 MC	1.65	#6035	7-9.1 MC	1.65

Send M.O. or Check. Shp. Chgs. C.O.D.
COMMUNICATIONS EQUIPMENT CO.
131 Liberty St., Dept. Q-7 New York 7, N. Y.

ACCURATE COMPONENT TESTER
Just Published!
Measuring Bridge Design Booklet



Gives complete details of a new circuit which permits rapid precision measurements of resistances, capacities and inductances. Complete plans—simple, easy text, tables, diagrams—which guide the technician, amateur or engineer in developing instrument with linearity of indicating scale according to own requirements!! Money Back if not satisfied. Send only $1.00 to
TECHNOLOGICAL DEVELOPMENTS
475-D Fifth Avenue, New York 17, N. Y.



Large, bright red letters are clearly read across the room. Fine for MOBILE or FIXED STATION. Black wrinkle case 5" x 2⅝" x 1". Uses screw base pilot lamp.
Price .....$1.50 P.P.

HAWKINS NAME PLATE CO.
3208 E. 56th N., KANSAS CITY 16, MO.

per to strike the coherer tube and automatically decoherer the filings.

A most important improvement in Marconi apparatus was the introduction of tuning methods applied to both transmitter and receiver; this was primarily the work of Sir Oliver Lodge. The procedure at first involved the use of metal cones or cylinders to provide the necessary capacitance; later, adjustable coils were used together with an early form of variable condenser. *Figure 2* shows a variation of Marconi equipment in which tuning is accomplished by means of the transformer *OT*, which is provided with means of changing inductance through the use of spring clips. Originally, the condenser *C* consisted of two banks of large Leyden jars; later, a condenser having glass plate dielectric and sheet copper conductors was used. The use of mica as a condenser dielectric was not fully investigated until during World War I.

[*To be continued*]

YL'S FREQUENCY

(from page 28)

special interest is handling traffic. She is secretary of the C.Z.A.R.A. and a member of MARS. . . . **KZ5DG**, Grace Dunlap, hails originally from Massachusetts, but when Stateside now operates WØDLU. The XYL of KZ5GD, they have two jr. ops. Favorite frequency is 28.770, and she is a member of MARS. . . . **KZ5NN**, Dee Brewer, and her OM, KZ5TB, first met via ham radio when Tex was stationed on Okinawa. She comes from the middle west but calls Texas home; call there is W5TOW. . . . **KZ5BM**, Bess Morton, was born in the Canal Zone, but has the Stateside call W6GST. Bess works and has three jr. ops so QSOs are when she can catch them, usually on 28.900.

KZ5KA, Kay Howe, is an ex-Hoosier gal, the XYL of KZ5RM. Her other call is W9RIH, and her special interest is working maritime mobiles. **KZ5CN**, Bess Whittredge, comes from Texas and is the newest operator among the Q R Marys. The XYL of KZ5FJ, she also is W5VDH. Favorite spot is 28.930 and she also operates in MARS.

YL Get-Togethers

From **W8GJP** we hear that about 130 women attended the Dayton, Ohio, Amateur Radio Association's "Ham-Vention," of whom 11 were licensed YLs. These were: W8RVP, W8HUX, W8HWX, W3UUG, W9ILH; W9QLH, W9JUJ, W8JLP, W8FYT, W8HDB, and W8GJP. They had a luncheon at the Biltmore Hotel, played cards in the afternoon and visited a TV station where four of the gals took part in the program.

The Fresno Radio Club held its annual hamfest early in May with these YLs attending: W6BLI, FEA, GEV, GQZ, HHD, MWU, PJF, QVK, ZKD, ZYD and W4KZT.

The biggest YL get-together so far this year was the New England YL meeting held in April at Foxboro, Mass; 23 YLs turned out, many coming quite some distance. The YLs were: W1MCW, W1RYJ, W1VBT, WN1UPK, WN1UPZ, W1TUD, ex-W8BPT, W2EWO, W1UKR, W1FOF, W1SVN, W1HRB, W1MUW, W1UQA, W1SAJ, W1TRE, W1QON, W1FTJ, W1QJX, W1OME, W1BCU, W1HIH, W2WP. The gals enjoyed an FB luncheon and lots of rag-chewing. A couple of the YLs combine hobbies of flying and hamming. W2WP, Alice, flew up from Staten Island in her own Piper Cub. She landed near the place of the meeting and stayed overnight with W1BCU, Peg. WN1UPZ, Helen, also a flyer, is a member of the "99 Club" formed by Amelia Earhart.

W7HHH writes that the 20th annual Oregon Amateur Radio Assn. convention at Eugene drew a large number of XYLs and 16 licensed YLs. The gals took in a flower

show and made a tour of the University of Oregon. There also was a special breakfast with small fancy cups as favors. In the prize drawing at the banquet WN7RAX, June Trueax, won a VFO and W7HHH got an HY75. The YLs attending: W7ECC, FKS, FXE, GLK, GPO, HER, HHH, ITZ, JFM, NJS, NTT, and these WNs: WN7QWX, QXH, RAX, RGJ, RIC.

A note for future conventions and YL get-togethers. **W1QON**, Publicity Chairman for YLRL, would like to remind, the gals that the YLRL photograph album is available for conventions, etc. Eleanor would like a couple of weeks' notice so she could get it out in time, but would be happy to send it for any such meetings. And, incidentally, she would appreciate your additions to the album.

From **W6LBO** we hear that the Los Angeles YL Club has newly elected officers, with W6NLM, Beulah Barrick, president; W6KER, Gilda Shablo, secretary, and WN6PJU, Mildred Griffin, treasurer. W6NLM was awarded the Club's hotly contested Activity Contest prize for her consistent operations, net check-ins, and club attendance during the past year.

Another YL op-to-be is being welcomed with the arrival of a baby girl to **W6LMP**, Betty Shumaker. Congrats, Betty!

Till next month, 33—**W5RZJ**.

ANTENNA RESONANCE

(from page 66)

Where the variable capacitor is used, it is suggested that some sort of gear reduction drive arrangement, such as the *Millen* #10000 (16:1 ratio), be used between the flexible shaft and the capacitor. From the diagram, it will be noted that the capacitor must be insulated from ground, which will also require an insulated coupling between the drive mechanism and the capacitor rotor.

A number of different lengths of flexible control cable may be found in surplus. If available lengths are too short, several pieces may be connected together by an improvised coupling arrangement between them. Speedometer cable may also be utilized for the flexible control shaft.

During operating periods, the antenna should be remotely tuned to resonance as indicated by the point of maximum loading on the final amplifier. An alternate method of indication is the use of a simple r.f. field indicator, located on the dashboard, similar to one already described in CQ[3]. This device will indicate correct antenna tuning at the point of maximum radiation.

The choice between the methods of remote control tuning may be a question to be determined according to the availability of components, economics, and the convenience connected with each individual installation. No matter which of the two methods is used, the ability to maintain resonance and radiating efficiency, over an entire band, certainly outweighs the small losses, especially since measurements have indicated that these amount to a decrease of less than 0.5 db in field intensity.

NOTE: It is possible to build a variable inductance shown in the photographs from war-surplus parts currently available on the open market. One of the first models constructed by the author was made in that fashion.

3 "Crystal Ball for your Mobile Rig," George M. Brown, W2CVV; CQ, August, 1949, page 26.

ATTENTION
MOBILE HAMS

COMPLETE MOBILE PACKAGE — NOTHING ELSE TO BUY. OUTSTANDING MOBILE SIGNALS USE MOTOROLA EQUIPMENT—BACKED BY YEARS OF COMMUNICATION EQUIPMENT EXPERIENCE — WORLD'S LARGEST PRODUCER OF 2-WAY MOBILE EQUIPMENT.

A mobile transmitter with a double feature FM or AM at flip of the switch, the MOTOROLA FMT-30-DMS 27-30 MC. . . **$130.00**

P-7253 spring base rear-mount antenna. . **$23.13**

MOTOROLA P-69-13 or 18-ARS receiver with special noise limiter for use with any converter having 1440-3000 KC. **$60.00**

New Gon-set Tri-Band Spread Converter **$47.60**

3-30 famous Gon-set converter complete to connect to the P-69-13 or 18-ARS receiver **$44.75**

P-327-E Fire wall loud speaker **$7.50**

The above comes complete with all necessary accessories and mounting hardware. Order direct or through the Motorola National Service Organization member in your area.

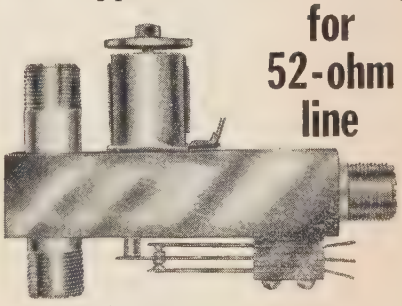
NOTE: This Receiver and Transmitter is equipment which has been returned from the field, modified and rebuilt for Amateur Service.

For further information write to:

MOTOROLA INC.

Amateur Sales Dept. CQ July
1327 W. Washington Blvd., Chicago 7, Ill.
Attention: Harry Harrison, W9LLX
Telephone—TAylor 9-2200, Ext. 161

New Type Coaxial Relay for 52-ohm line



Handles 1000 watts at 100 mc.
External s.p.d.t. switch on all voltage types.
Both AC and DC models available.

For greater efficiency and maximum receiver protection use a 115 Volt A.C. model at the home QTH.
110-115 Volt A.C. .....**$12.50** amateur net
6, 12, 24 Volts A.C. and D.C. **$11.50** " "

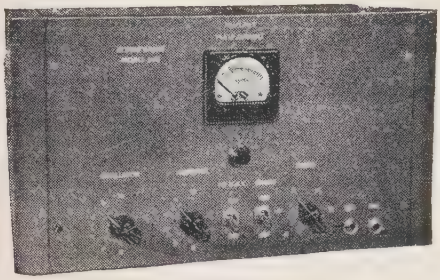
(For more complete details, see May 1952 advertisement in CQ)

DEALER INQUIRIES INVITED

DOW-KEY CO., INC.
Warren, Minn.

BUY OF A LIFETIME!

TRIED AND PROVEN THE WORLD OVER



LETTINE MODEL 240
TRANSMITTER WITH MOBILE CONNECTIONS AND A.C. POWER SUPPLY

This outstanding transmitter has been acclaimed a great performer throughout the world. It is excellent for fixed station, portable or mobile operation. Even if you have a transmitter of your own you can't afford to miss this wonderful buy, direct from our factory, ready to operate.

The 240 is a 40 watt Phone-CW rig for 160 to 10 meters, complete with: (8 x 14 x 8) cabinet, self contained A.C. power supply, MOBILE connections, meter, tubes, crystal and coils for 40 meters. Tubes: 6V6 osc., 807 final, 6SJ7 crystal mike amp., 6N7 phase inverter, 2 6L6's mod., 5U4G rect. Weight 30 lbs. TVI instructions included. 90-day guarantee. Price **$79.95.**

$25. deposit with order — balance C.O.D.

80, 20, 10 meter coils $2.91 per set. 160 meter coils **$3.60**. Also for CAP, Broadcast, MARS, Marine, State Guard.

LETTINE RADIO MFG., CO.
62 BERKLEY STREET VALLEY STREAM, N. Y.

TESTERS

BUILD YOUR FUTURE AT

SPERRY

ELECTRO-MECHANICAL

To test complex apparatus involving electrical servos, synchros, computing mechanisms and gyros. Familiar with schematics, trouble shooting, adept in the use of oscilloscope, VTVM and Volt-Ohm-Milliameter; 2 years engineering school or equivalent required; also 2 years service or industrial experience on gun-fire control computing mechanisms.

ELECTRONIC

Minimum 2 years experience in industry or government service in test, maintenance, and trouble shooting of radar systems; 2 years engineering school, 2 years amateur operating experience or equivalent required.

- **COST OF LIVING ADJUSTMENT**
- **FULL EMPLOYEE BENEFITS**
- **TOP RATES**

Send resume or apply in person to Employment Office

SPERRY **GYROSCOPE CO.**
Division of THE SPERRY CORP.
GREAT NECK, L. I., NEW YORK

Classified Ads

Advertising in this section must pertain to amateur radio activities. Rates: 25c per word per insertion for commercial advertisements. 5c per word for non-commercial advertisements by bona fide amateurs. Remittance in full must accompany copy. Phone orders not accepted. No agency or term or cash discounts allowed. No display or special typographical ad setups allowed. "CQ" does not guarantee any product or service advertised in the Classified Section. Closing date for ads is the 25th of the 2nd month preceding publication date.

NEW BC-453 thru 458; BC-1206. Xmtr, recvr, CRT, VHF and special tubes. Send for list. Cheap. W5DHJ, 1709 W. 30, Austin 3, Texas.

ATTENTION HAMS: Your station call letters in giant 3 inch, bright red plexiglas, complete with mounting track for only $1.98 per set. Send your call to: Pioneer Enterprises, Box 474, Grandville, Michigan.

CANADIANS: Complete Amateur Radio station equipment for sale. One-50-75 W. Phone and CW. xmtr in Hammond cabinet 16" x 21" x 36" high, nearly all Hammond parts. Xtal mike, seven xtals. Spare tubes. Works on all bands. One Hammarlund Comet Pro. Receiver with loud speaker, all bands including ten. One 2C. Frequency meter with manual. One Bach-Simpson No. 77 wavemeter and modulation meter-new. One SW3 National receiver. Approximately $150.00 worth of spare parts, including heavy duty power supply. Offered for quick sale at $300.00. First certified cheque gets this bargain. Rowley Noyes, VE5BI Drawer N, LLoydminster. Sask.

10 AND 20 METER BEAMS $23.25 up. Aluminum Tubing etc. Willard Radcliff, Fostoria, Ohio.

WANTED: Millen 90810 VHF transmitter, other VHF gear 522 ARC 1-3-4-5. Describe Price First Letter. Cyril F. Hoffman, Uvalde, Texas.

100 KC STANDARD CRYSTAL RCA No. VC5M Guaranteed, Crystal, Special 3 Pin Socket, and Circuits—$4.25 Post Paid. Crystal Research Products, Dumont, N. J.

IMMEDIATE DELIVERY: Power Supplies for Bandmaster transmitters, $39.50, F.O.B. Alco Electronics, 102 Marston, Lawrence, Mass.

KILOWATT TRANSMITTER, 10 and 75 meter bands, in good condition, sale $450 cash or reasonable trade. Full description and details on request. W4UHZ, 8230 Division Ave. Birmingham, Alabama.

TRADE: BC645 partially converted all tubes plus extras, want 2 meter transceiver, GE 200 microamp meter fan type case, want EUD GImix. Have many other items. Write Tanenbaum, W2AQ, 1535 E. 8 St., Bklyn. 30, N. Y.

BARGAINS: New and reconditioned Collins, Hallicrafters, National, Hammarlund, Johnson, Elmac, Harvey-Wells, Gonset, Morrow, RME, Millen, Meissner, Lysco, others. Reconditioned S38 $29.00, S53 $49.00, S40A $60.00, S4OB $79.00, SX43 $119.00, SX42 $199.00 SX62 $199.00, SW54 $35.00, NC57 $69.00, NC173 $139.00, NC183 $199.00, HR050 $249.00, HR050T1 $299.00, HQ129X $139.00, SP400X $259.00, Meissmer EX $59.00, Harvey-Wells TBS50 $79.00, DB22A, HF-10-20, HR07, Lysco 600, Collins 75A1, 32V1, 32V2, others. Shipped on trial. Easy terms. List free, Henry Radio, Butler, Mo.

QSL CARDS? Unbeatable samples 25c. Sackers, W8DED, Holland, Michigan.

FOR SALE: Globe King transmitter with coils for 40, 20, 10 meters, $275. TBY7 complete $17. Variety of parts, tools. Details from W2BKV, 119-14 80th Road, Kew Gardens 15, New York.

10-20-40 ELEMENT, 2 METER aluminum brownie beams. Made to order. Write W3LMC, 4330 Glenmore Avenue, Baltimore 6, Maryland.

GLOBE KING 400A. 400 watt CW or phone transmitter, 80 thru 10 meters, $299. R. M. E. VHF converter $59. Both items like new, used less than fifty hours. W5RJR, 2351 North Akin, Texarkana, Texas.

BARGAINS: New and used, Collins Hallicrafters, Hammarlund, National, RME, Gonset, Lysco, Mallard, etc. Write Dossett, W9BHV, 855 Burlington, Frankfort, Write Dossett, W9BHV, 855 Burlington, Frankfort, Ind.

SELL: Teletype equipment, Panoramic adaptor, BC-221 freq. meter, 250TH, LM freq. meter with modulation. Want: PE-237, GN-38, BC-1306, APS-3 cables. Technical manuals. T. Clark Howard, W-1-AFN, 46 Mt. Vernon St., Boston, Mass.

WANTED: Top prices paid—Navy selsyns 1F, 1G, 1CT, 5F, 5G, 5CT and BC-348, BC-221, AN/ART-13, AN/ARC-1, AN/ARC-3, RTA-1B. Lectronic Research, 719 Arch Street, Philadelphia.

WANTED: Your attendance at the Mid-American and Dakota Division ARRL Convention, September 5, 6, and 7, 1952. Nicollet Hotel, Minneapolis, Minn.

CRYSTALS, Ham or Novice, immediate delivery from stock. Mounted in FT-243 holders, ½" pin spacing. Novice 3700-3750 kc. "Ham" 1975-2000 kc, 3500-4000 kc, 7000-7350 kc, 8000-8200 kc. Your choice of frequency, plus or minus 5 kc. $1.00 each postpaid. Potter Radio, 1314 McGee, Kansas City 6, Mo.

SELL: Two used BC-453A receivers 85 kc. IFs, Never converted—$11. each postpaid W1RAN, 207 Thames Street, New London, Conn.

NOVICE TRANSMITTER KITS including crystal, meter, tubes, chassis, power supply—all parts. 20 watts (6L6) $19.95. 75 watts (6AG7-807-807) (80-11 meters) $49.95. Send $10, balance COD, express inspection permitted. Dixon Electronics Co., 13444 W. McNichols, Detroit, Mich.

FOR SALE: Hallicrafters S40-A, complete with calibration osc., and audio noise filter. Excellent condition. F. O. B., $60.00. Transmitter power supply, 650 v. @ 150 ma, and 300v regulated. Best offer. F. O. B. John B. Camp, W6AAI, 142 South "G" Street, Oxnard, California.

GOING TO TRY for an amateur radio operator's license? Check yourself with a complete coverage multiple-choice type test similar to those used by the F. C. C. Surecheck tests with answer key. Novice Class $1.50. Conditional and General Class $1.75. Advanced Class $2.00. Order your time-tested surecheck test today. Amateur Radio Supply, 1013 Seventh Avenue, Worthington, Minnesota.

QSLs! Samples 10c. Tooker, Drawer T, Lakehurst, N. J.

MAGNET WIRE, 22 to 40 on original spools, 30c per pound. W6SCR, 17 Sheridan Road, Oakland, California.

BARGAINS: EXTRA SPECIAL! Motorola P-69-13 mobile receivers $29.50; Globe King $315.00; HT-9 $199.00; HRO-50 $275.00; Lysco 600 $109.00; HRO-7$199.00; Collins 75A1 $275.00; HRO-5T $175.00; SX-71 $159.00; HRO Senior $119.50; RME 2-11 $99.50; RME-45 $99.00; Meissner EX Shifter $59.00; S-40A or SX-16 $69.50; VHF-152 $59.00; HF-10-20 $59.00; SX-24 $69.00; Globe Trotter $79.50; Meissner Signal Calibrators $24.95; MB611 mobile transmitters $29.00; 90800 exciter $29.50; RCA Chanalyst $69.50; XE-10 $14.95; Gonset 10-11 converter $24.95; and many others. Large stock trade-ins. Free trial. Terms financed by Leo, WØGFQ. Write for catalog and best deal to World Radio Laboratories, Council Bluffs, Iowa.

WANTED: APR-4, other "APR-", "APS-", "APT-"; ARC-1, ARC-3, ART-13, BC-348, BC-221, etc.; TS-12, 13, 35, 120, 146, 155, 173, 174, 175, 323, other "TS-", particularly microwave equipment, Spectrum Analyzers; G-R, Ferris, etc. units; 723/B, 3C22, all tubes; manuals, meters, parts, cable. Littell, Farhills Box 26, Dayton 9, Ohio.

TEFLON TAPE: we have a limited quantity of teflon tape of the .005-inch thickness and 12-inch width for sale in sheets up to five feet long. Available for experimental amateur work at 8c per running inch. Box 162, c/o CQ Magazine, 67 West 44th Street, New York.

FIRST $15.00 gets CQ 1945 and 1946 bound in green-gold lettering. Send $20.00, get unbound 1947 and 1948 issues also. Ed. Newman, 217 New York Avenue, Massapequa Park, N. Y.

NEED ROOM IN ATTIC—selling out surplus gear—send stamp for list—RCVR, audio filter, signal shifter, back issues CQ, QST. Ed. Newman, 217 New York Avenue, Massapequa Park, N. Y.

CRYSTALS: low drift, high activity, tailor made, 3500 to 8500 kc.—FT 243's. Desired frequency within 2 kc. $1 each, .01% crystals $2. each. Hundley Crystal Co., 2951 N. 36 St., Kansas City 4, Kans.

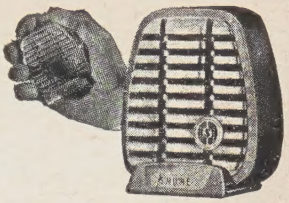
QSL CARDS $1.95 and up. Atlantic Press, Clifton, N.J.

TELETYPE MIDGET PRINTERS, tape transmitters; write for prices and information. We want: PE-237, BC-1306, GN-58, GN-45, TCS, ART-13, ATC, DY-11, DY-12, DY17, RA-34, RA-62, BC-348, BC-312, BC-342, teletype, APS, radar, BC-610-E, test equipment, technical manuals, tubes. Arrow Appliance, 25 Harrison Court, Lynn, Mass.

MAP PINS, round head, colors red, blue, green, yellow, orange, brown. One buck brings fifty. Robert Products, Harvard, Illinois.

QSLs—SWLs. Super-gloss. 10 colors, four card stocks, seven styles. Samples 10c. Almar Printing Co., Farragut, Iowa.

"The Hercules"



In amateur radio, just like lots of other hobbies, there are all kinds of gadgets and accessories which one acquires in time as a matter of course. However, probably the first item a radio amateur requires, after obtaining his basic receiver and transmitter, is a dependable microphone, so voice "contacts" can be made. Regardless of whether you are a new-comer or an old-timer in amateur radio, the new Controlled Reluctance mike, the "Hercules" (manufactured by Shure Brothers, Inc., 225 W. Huron St., Chicago, Ill.) warrants your consideration. It is a hand-held magnetic unit that provides clear reproduction, high speech intelligibility, high output and ruggedness at an amazingly low price. Being magnetic, this mike is practically immune to varying conditions of heat or humidity. The "Hercules" can be used indoors or outdoors, fits snugly in the hand, sits firmly on a desk or can be placed on a stand. There are two models with an output level of 52.5 db below 1 volt per microbar. Model 510C "Hercules" lists at $15.00 while the Model 510S, which has a built-in switch, lists for only $17.00. The "Hercules" has a die-cast case, with a Metallic Green finish. See the "Hercules" at your Distributor or write Shure Brothers for further details.



When Planning Your Civil Defense Net, Specify

PREMAX ANTENNAS

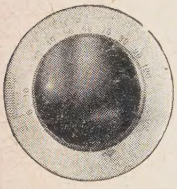
For RACES, CD, CAP, Control Centers, Aid Check Points and Mobile Installations, Premax Antennas are exceptional in performance and low in cost. Send for the new Civil Defense and Marine Bulletins, just off the press. They show just what you've been hoping for.

PREMAX PRODUCTS
DIVISION CHISHOLM-RYDER CO., INC.

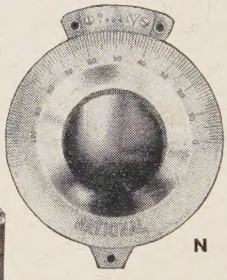
5204 Highland Ave. Niagara Falls, N. Y.

NATIONAL

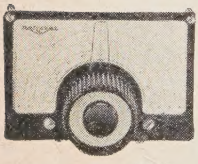
- Proven
- Dependable
- Quality



AM



N



ACN

POPULAR NATIONAL DIALS

For years, National dials have been the popular choice of amateurs, experimenters and commercial users because of their smooth, velvety action, easily-read scales, and quality construction.

Many dials, like the N and ACN dials shown, can be specially calibrated or supplied with blank scales for commercial application. Write for drawings and prices.

National

EST. 1914

NATIONAL COMPANY, Inc.

MALDEN, MASSACHUSETTS

CQ Ad Index

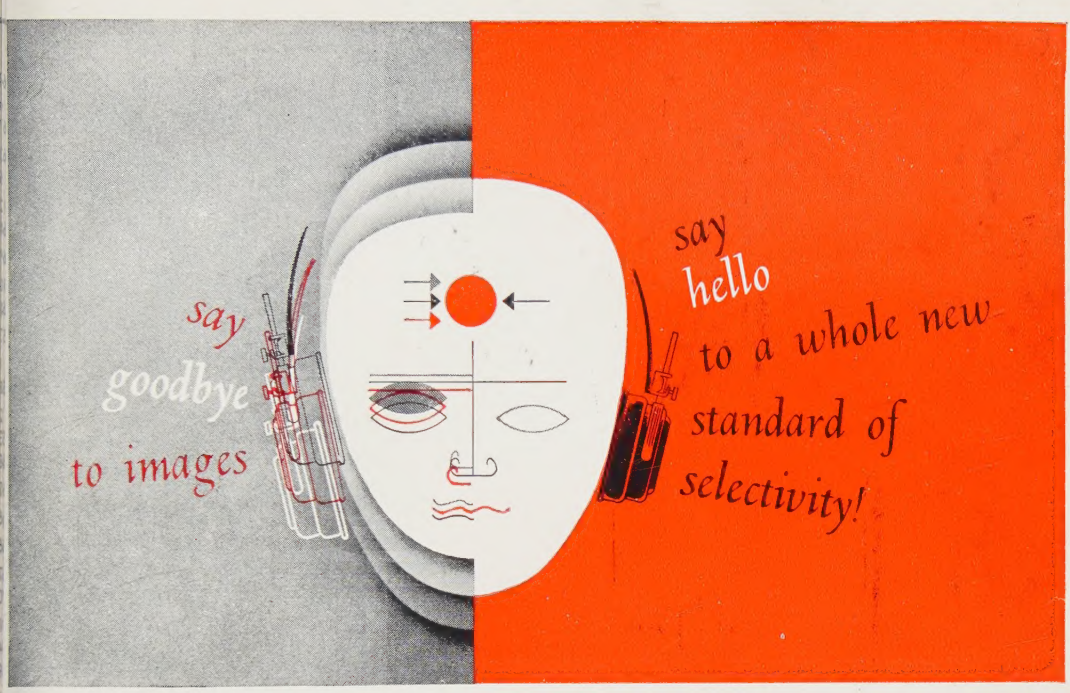
American Electronics Company 64
American Phenolic Corp. 6
Atronic Corp. 67
Barker & Williamson 2, 63
Bud Radio, Inc. 5
Collins Radio Company 12
Communications Equipment Co. 68
Dow-Key Company 69
Eitel-McCullough, Inc. 10
Electronicraft, Inc. 68
Fort Orange Radio Distr. Co. Inc. 57
General Electric Co. 1
Gonset Company 58
Hallicrafters Company ..... Cover 2
Harvey Radio Company, Inc 53
Hawkins Name Plate Co. 68
Instructograph Co. 67
Johnson, E. F. Co. 66
Klein, Manuel Co. 65, 66
Lake Service Corporation 67
Lettine Radio Mfg. Co. Inc. 70
Marmax Electronics 51
Millen, James Mfg. Co., Inc. 4
Motorola, Inc. 69
National Company, Inc. ..... 9, 72, Cover 3
Petersen Radio Company, Inc. 7
Platt Electronics Corp. 59
Premax Products 71
Radcom Engineering Co. 66
RCA Tube Dept. ..... Cover 4
Rumph, Dave Co. 60
Sanett, Bob 67
Shure Brothers, Inc. 71
Sonar Radio Corp. 8
Sperry Gyroscope Co. 70
Suburban Radio Co. 61
Tab 72
Tallen Company, Inc. 67
Technological Developments 68
Trans-World Radio-TV Corp. 66
Vaaro Electronic Engineering Co. 61
V & H Radio Supply Co. 68
Vibroplex Co., Inc. 64
World Radio Laboratories, Inc. 55

WANTED IMMEDIATELY!
for CRITICAL DEFENSE NEEDS
Tubes • Crystals • End Equipment

OAS/VR75	3C23	12SC7M	833A,884
OB3/VR90	3E29,829B	FG17,32,33	927, 1000T
OC3/VR105	4C35	100TH	1614, 2050
1N21,A,B	5C22	FG104,172	5725
1N23,A,B	5R4GY	250TH,TL	5727
1N25,26	6AC7M	304TH,TL	5749
Xtals: 100Kc,	6AG7M	368AS	5750
200Kc, 1000Kc	6B4G	450TH,TL	5751
2D21	6C21	KU627	5654, 5670
2K25, 723AB	6L6M	726C	5686
2J & 4J Magnetrons, Klystrons	6SC7M	750T	5726
	7C7	807,810	5814
	7AG7	811,813	9001,2,3

All Army-Navy Gear: AN, ART, BC, I, PE, PU, RA, SCR, TG, TS. WAVE GUIDES: PL & UG CONNECTORS.
TURN YOUR SURPLUS INTO SPOT CASH & SERVE YOUR COUNTRY'S NEEDS AS WELL.
Send Lists & Prices—Immediate Reply! Dept. C.

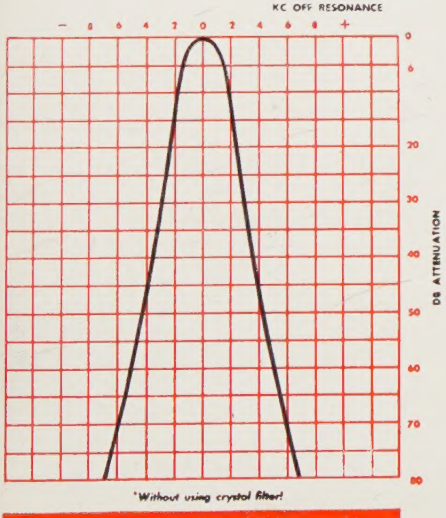
"TAB" 111 Liberty St., N. Y. 6, N. Y.
That's a Buy! Phone WOrth 2-7674



THE NEW

HRO *Sixty*

IS HERE!





Dual Conversion! 12 Tuned I. F. Circuits!

Here now — the HRO Sixty — latest and greatest of a great series! Now, in addition to all the wonderful features of the HRO-50T1, you get *dual conversion* on all frequencies above 7 mcs. *plus* 12 permeability-tuned circuits in the 3 456-kcs. I. F. stages! Other new features include current-regulated heaters in the high-frequency oscillator and the 6BE6 mixer. High-frequency oscillator and S-meter amplifier are voltage regulated.

Be sure to see and hear the ultimate — **the HRO Sixty!**

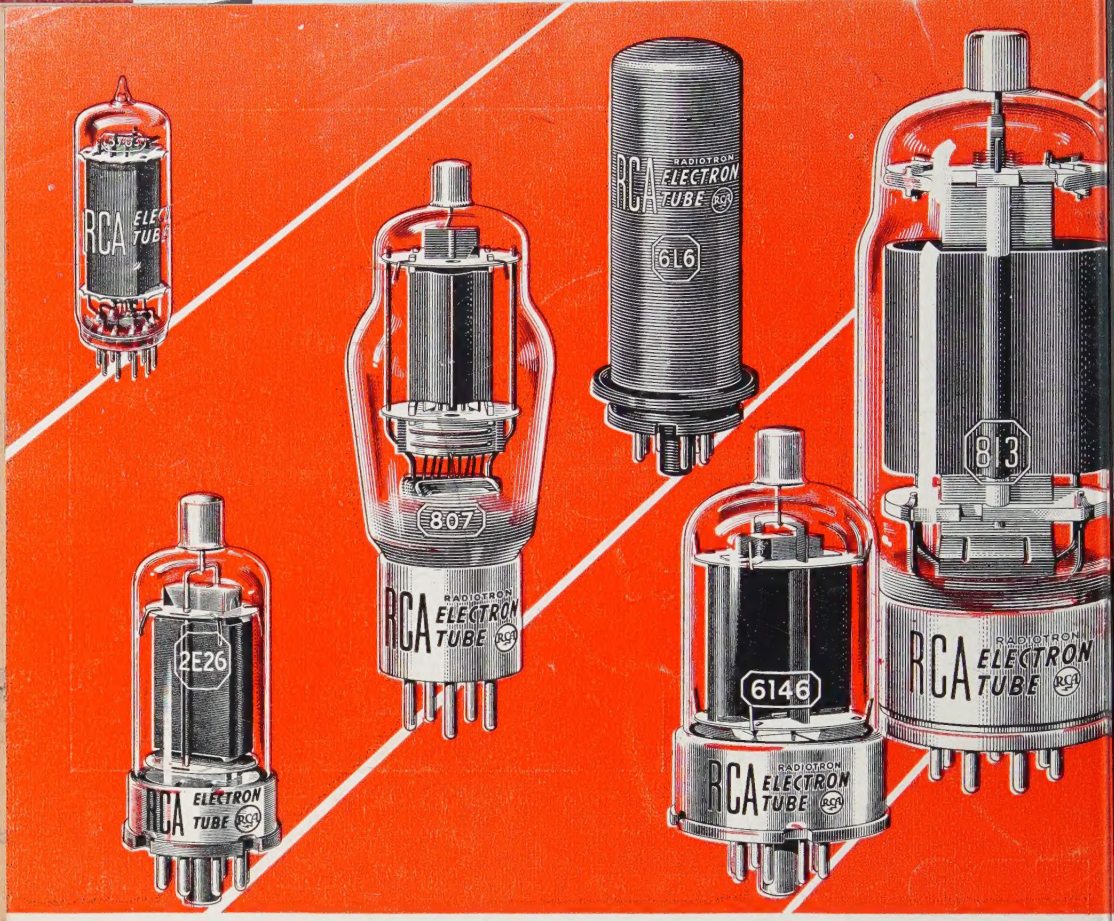
National

NC

EST. 1914

NATIONAL COMPANY, Inc.

MALDEN, MASSACHUSETTS



JUL 8 1952

Why RCA-developed beam power tube

are best for your transmitter

SIMPLY STATED, beam power tubes combine good output efficiency with low drive requirements.

But, let's get down to cases . . .

. . . because you get high output with low driving power, you need fewer intermediate stages. Fewer stages mean a compact, efficient transmitter.

. . . since high driving power is *not* a requirement, there is less chance of TVI.

. . . for economy—most beam-power-tube circuits can use simple, inexpensive, low-voltage power supplies.

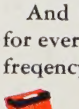
. . . beam power tubes are superior for quick-change, multi-band transmitters because they seldom require neutralization in well-designed circuits.

. . . the fact that plate voltage can be changed w out affecting other circuit adjustments makes it s ple to reduce power for local QSO's.

. . . beam power tubes operate efficiently as quency multipliers, drivers, finals, and modulators

There you have the reasons why beam power tu lead all other types in modern transmitter design.

And remember—there's an RCA beam power t for every input up to 500 watts (per tube) . . . and ev freqency from 1.8 to 148 Mc.



TUBES FOR THE PROFESSIONAL

. . . PRICED FOR THE AMAT

The dependability of commercially proved RCA Tu costs you no more. Buy genuine RCA Tubes and buy the best. See your local RCA Tube Distribu

RADIO CORPORATION of AMERICA

ELECTRON TUBES **HARRISON, N.J.**